

Vegetable Product Series, No. 38.)

THE
AGRICULTURAL LEDGER.

1898—No. 1.

(REPRINT FROM THE BENGAL BULLETIN No. 4.)

BRASSICA SP.

(RAPE AND MUSTARD.)

DICTIONARY OF ECONOMIC PRODUCTS, Vol. I, P. 799—855.)

THE MUSTARDS CULTIVATED IN BENGAL.

*Note by Surgeon-Major D. PRAIN, M.B., M.A., Superintendent of the
Royal Botanic Garden, Sibpur, Calcutta.*



CALCUTTA:
BENGAL SECRETARIAT PRESS.
1898.

Price 8 annas.

THE
AGRICULTURAL LEDGER.

1898.

(SECOND YEAR.)

NO. 1.

THE REPORTER ON ECONOMIC MATTERS TO THE GOVERNMENT OF INDIA.



CALCUTTA:
OFFICE OF THE SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1901.

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Royal Botanic Garden, Sibpur, Calcutta.

*Note on the Mustards cultivated in Bengal; by SURGEON-MAJOR
II. PRAIRIE, Superintendent of the Royal Botanic Garden, Sibpur.*

SECTION I.—INTRODUCTION.

THE Director of Land Records and Agriculture, Bengal, desiring to obtain accurate information regarding the mustards cultivated in the Lower Provinces, in 1895 submitted to the Superintendent of the Royal Botanic Garden some 150 different samples of their seeds. These samples were made over to the writer for examination in the ordinary way. After an attempt to arrange them with the aid of Indian works on Botany, it was found necessary to abandon the task as hopeless: the names and information supplied with the samples were self-contradictory, and in many instances irreconcilable with the statements made by Roxburgh (*Flora Indica*, iii. 117—125), Hooker and Thomson (*Journal of the Linnean Society*, v. 109—172, and again in *Flora of British India*, i. 165—167), Duthie and Fuller (*Field and Garden Crops of the North-West Provinces and Oudh*, ii. 28—34), and, finally, Watt (*Dictionary of the Economic Products of India*, i. 520—534).

The only hope of settling the difficulties that beset the enquiry seemed to lie in following for Bengal the method adopted by Duthie for Upper India—in cultivating carefully all the kinds of mustard grown throughout the Lower Provinces, and comparing them in the living state at all stages of their growth. It was too late to do this in 1895; but the Director, on being requested by the writer to call for a second set of samples, was at the trouble to do so. These samples were sown on October 22nd and October 23rd 1896, in a portion of the Sibpur Experimental Farm made over to the writer for the purpose. The plants were made the subject of study from the time of their germination till they were harvested. The present note embodies the results of this study.

Three different Mustard

The cultivation of these plants has shown that the confusion amongst the Bengal mustards is largely an affair of names and statements: as regards the plants themselves, there is little difficulty. Practically, there are but three mustards cultivated in Bihar and Bengal. These three constitute the familiar *Rai*, *Sarson*, and *Tori* crops. Each one of the three varies within its own limits to a greater or less extent: none of them shows the slightest tendency to pass from one to another. So far at least as the Lower Provinces are concerned, the existence of anything in the nature of a form intermediate between *Rai* and *Sarson*, *Rai* and *Tori* or even between the more closely allied *Sarson* and *Tori* is wholly imaginary.

Still the idea that such intermediates should exist is not altogether inexplicable. Examples of the same form sent from different districts may bear any of the three names given above, while the differences between flowering examples of *Sarson* and *Tori*, with the leaves still attached, and between fruiting examples of *Tori* and *Rai*, whence the leaves have fallen, are much less salient in herbarium specimens than in the living plants. And where three specimens of one form may be submitted for examination from three different districts under as many different native names, along with three specimens of different forms from still other districts, but with the same native name given for each, it is not to be wondered at that it should have been supposed, by more than one author, that the various forms at times pass into one another. It is hard to realise that vernacular names as applied by the natives themselves are not merely worthless for purposes of comparison, but may, if relied on, be highly misleading. Such, however, is the case; although often, perhaps indeed usually, rigidly enough applied within a given district or group of districts, native names are worse than useless when they are depended on to yield information regarding another group of districts. And yet it is inexpedient, indeed in the present instance, it is impossible, to dispense with the use of native names. It is a safe general rule, when precision is desired, to employ, in referring to any plant, what is termed its scientific name. There are, however, occasions, and this is pre-eminently one of them, when even systematic botany is fallible. The scientific names of our Indian mustards, besides being, in some cases, cumbrous and clumsy, are, in every case, even more likely to mislead—were such a thing possible—than the native names themselves. For, besides the difficulties that later writers have experienced in differentiating the Indian

—many of these difficulties, it may be said in passing, would never have arisen if more reliance had been placed on Roxburgh's judgment—there are others of another kind to contend with. These have arisen from the attempt to identify the various Indian mustards with European cultivated forms—an attempt which, as is feared, has hardly been more successful than the attempt to distinguish the mustards themselves.

The difficulties of this problem can only be satisfactorily solved by the simultaneous culture of all the Indian and all the European kinds and by a careful comparative study of the various forms at every stage of growth. Nor will this study be effective without simultaneous culture and study of the Chinese kinds among which, the writer is inclined to believe, will be found the stocks whence European and Indian forms alike have been derived. To describe the Indian mustards, and yet make no suggestion as to their probable affinities, would be obviously to avoid a portion of the task incumbent on the taxonomic botanist; in the accounts of particular mustards that follow, the writer has therefore expressed the opinion he is inclined to hold as to the probable general relationships of each. But as regards certain details, he asks for the right to retain an open mind, and he ventures to suggest to others the advisability of doing the same.

It is doubtless convenient for the District or Settlement Officer to speak or write of a particular crop as "Mustard," "Colza," or "Rape;" the names are familiar, and convey a fairly definite idea. It would, however, be safer to qualify the terms by speaking of the plants as "Indian Mustard," "Indian Colza," "Indian Rape"—safer still, provided the three crops can be recognisably described, to speak of them simply as "Rai," "Sarson," and "Tori," respectively, and, as far as possible, to avoid the use alike of the European popular and scientific names.

Rai, or Indian mustard, there is not any doubt, is the plant that Roxburgh has described as *Sinapis ramcea*, and that Hooker and Thomson have described as *Brassica juncea*. But in their original paper, published in the *Linnæan Society's Journal*, the native name and the note as to the qualities of the plants—though in each case the name and note are quite accurate—have been transferred from Rai to Sarson, and vice versa. The botanist has, of course, merely to read the technical descriptions of the plants to detect the transfer of the notes; but the result has been that every non-botanical consultant of the paper in question has gathered

Inadvisability of using

that the scientific name of *Rai* is *Brassica campestris*, and that *Brassica juncea*, which really is the name of *Rai*, is the scientific term for *Sarson*.

Then, *Sarson* and *Tori* are certain to be misunderstood if their scientific names are used. Both are, as a rule, referred to *Brassica campestris*; and though no one who has ever seen the two plants growing side by side will venture to say that they are the same thing, it is not unusual to find them treated in botanical works as merely different varieties of one particular sub-species of *Brassica campestris*. Roxburgh, who knew the two crops, treated them as distinct species, naming the former *Sinapis glauca*, the latter *Sinapis dichotoma*. But Roxburgh, usually so accurate, has somewhat confused the names of the two: he gives the name of the first as *Sweet Rai* (white mustard), of the second as *Shanahi* or *Shorshi*. This is exactly what the two are called in Central Bengal, and so far, therefore, all is well. But he gives the Hindi term *Sarson* as the equivalent of the Bengali *Shorshi*, and applies it therefore to *Tori*. This precisely reverses the actual usage. The name *Sarson* is never applied to the plant that in Central Bengal is termed *Sarisha* (or *Shorshi*, as Roxburgh spells it), but always to the plant that in Bengal is termed *Sweet Rai*. Roxburgh's third name for *Tori* is *Sada Rayes*,—a mere *lapsus calami* for *Sadharan*, which has escaped the notice of the editor of the volume.

The nice academic questions involved in deciding what constitutes a species, sub-species, or variety are fitly discussed in monographs of natural families. But in notes like the present, purely economic in scope, such refinements tend only to confusion. When the layman, in the course of business or duty, is brought face to face with two plants so dissimilar in appearance, mode of growth, time of ripening, and method of cultivation, and so completely wanting in anything of the nature of intermediate forms, as *Sarson* and *Tori* are; and when, on turning to a botanical work, he finds it stated that they are the same thing, or at most only different varieties of the same thing, he is apt to wonder at systematic botany. Even if he appreciates the precise meaning of the expression, it is too much to expect that he shall care to write or speak of *Brassica campestris*, subsp. *genuina*, var. *glauca*, and *B. campestris*, subsp. *Napus*, var. *dichotoma* when he can use the terms *Sarson* and *Tori* instead. Indeed, it is well for all concerned to cultivate this frame of mind, for to follow the botanical arrangement accorded to these mustards is trying either to reason

the scientific names of the Mustards.

or to faith. Systematic botany, not content with first denying that *Tori* and ordinary *Sarson* differ, insists that *Uhi Sarson*, which is unlike ordinary *Sarson* only in having pendent pods, is a separate species (*Brassica J-toulouensis*), and further declares that if the pods of ordinary *Sarson* have 4 rows of seeds instead of two, it constitutes still another species (*B. 4-seleis*); statements that amount to declaring two equal and similar parts to be, if taken conjointly, rather less, if taken separately, each of them greater than the whole.

On account of the confusion just outlined, and it may be remarked that this sketch is far from exaggerating the tangle that exists, the writer has given an altogether subordinate value to the scientific names of the plants, and has employed the leading vernacular ones to designate the various mustards themselves, regarding which, as plants, no doubt is possible.

The present note does not deal with the mode of cultivation, acreage under crop, outturn of, or trade in, the mustards and their oils in the various parts of the Lower Provinces. It deals merely with the botanical characters of the various mustards; the relationship they bear to each other and to the names applied to them throughout Bengal. Plates are given in illustration of the mustards, and maps are employed to explain the distribution of the kinds and of the names used to designate them.

Besides the examples of *Rai*, *Sarson*, and *Tori*, of which the writer has had respectively 46, 45 and 48 plots under cultivation, there were two others—one from Chittagong and one from Kalimpong in British Bhutan—that proved quite distinct from any of the three, and that call for separate description.

One of these—the Kalimpong *Rai*—possessed the great interest of being *Sinapis rugosa*, a Roxburghian plant that has been lost sight of since Roxburgh described it, and the writer accordingly invoked the assistance of Mr. Pantling, First Assistant of Cinchona Cultivation in British Sikkim, in a search for still another mountain mustard—that described by Roxburgh as *Sinapis cuneifolia*, which has been equally lost sight of and which the Department of Land Records and Agriculture had not communicated. The search did not result in the re-discovery of *S. cuneifolia* but was the means of disclosing yet another form most nearly allied to, but quite distinct from, *Tori*. Hardly had this information been received from Sikkim when Dr. Watt, Reporter on Economic Products to the Government of India, returned

 Botanical account of the

from an official tour in North Bengal with the interesting information that the cultivation of what is perhaps the lost *Sinapis cuneifolia* prevails throughout the area occupied by the populations of Cachari or Rajbansi origin, i.e., throughout Northern Bengal and in the valley of Assam. Then, no account of the mustards cultivated in Bengal could be deemed complete that left out of consideration the "China cabbage," if for no other reason than that a recent order enjoins its compulsory cultivation in Jail gardens.

Neither the 'black' nor the 'white' mustards of Europe are grown as crops anywhere within the limits of the Lower Provinces. No description, therefore, is given of either of those kinds. Since, however, they may occasionally be met with in the gardens of the curious, and as both should be familiar to officers of European experience, a place has been given to them in the Key.

SECTION II.—BOTANICAL ACCOUNT OF THE MUSTARDS OF BENGAL.

The mustards belong to the genus *Brassica* Linn., of the natural order *Cruciferae*, one of the most important genera in the vegetable kingdom, including as it does the varied forms of Mustard, Rape, Colza, Turnip and Cabbage. The present note does not deal with the Cabbage or the Turnip, both of which are quite exotic in the Lower Provinces, and only treats exhaustively those Colzas, Rapes and Mustards that form staple field or garden crops within the area under the rule of the Lieutenant-Governor of Bengal.

Following a brief technical description of the genus will be found a key to the species in this area. This key, in turn, is followed by a more detailed account of each of the species, varieties, cultivated races, and special forms to be met with in Bengal, the geographical distribution of each by districts and the names borne by each in the different districts being added. In arranging these districts it has not been found advisable to adhere to the present political divisions of the Lower Provinces. However convenient these may be from the administrative point of view, they do not always accord with natural facts. The deviations, however, have not been very great. They consist mainly (a), of the subdivision of Bihar into (1) Tirhut, north of the Ganges but not passing east of the Kosi, and (2) South Bihar, between the Ganges and Chota Nagpur; and (b), the subdivision of Bengal Proper into three parts, viz., (1) West Bengal,—the Burdwan and Presidency Divisions; (2) North Bengal,—the country east

Mustards of Bengal.

of the Kosi, north of the Ganges and west of the Brahmaputra; and (3) East Bengal,—the Dacca Division. Eight or more less natural areas are thus obtained, viz., Tirhut, South Bihar, Chota Nagpur, Orissa, West Bengal, North Bengal, East Bengal, and Chittagong. In giving the distribution of the various mustards the regions are noted in the above order.

BRASSICA LINN.

THE MUSTARDS, RAPES, TURNIPS, AND CABBAGES.

Annual, biennial, or perennial herbs, either smooth or with stiff or rough hairs; the lower leaves usually deeply pinnate or lyrate, the upper ones often entire; the flowers yellow. *Pod* linear, cylindric, or nearly so, more or less beaked at the top beyond the end of the valves; the beak consisting either of the conical style alone or including a portion of the pod itself, and then often with one or more seeds in it. *Seeds* globular, ovoid, or somewhat flattened; the seed-leaves folded longitudinally over the radicle.

A genus including 160 different forms, many of them, however, merely varieties evolved or races fixed under cultivation; the actual number of species probably not more than 80—90. The genus is a native of North Temperate regions, with apparently two centres of origin—an Oriental-Mediterranean and a Chinese. Under cultivation some of the forms reach, as cold-season crops, sub-tropical and even tropical districts.

There is only one Indian species that is not given in the subjoined key; it is excluded because it does not occur within the limits of Bengal. This species, *Brassica Tournefortii* Gouan, is a member of the group that has originated in the Oriental or Mediterranean areas; it is stated to have been once found in the semi-desert country between Ajmir and Delhi, and is, according to Edgeworth, cultivated in Western Tibet. From these points it extends westward to Italy and Spain, but does not come farther towards the East.

Key to the Mustards.

Key to the Mustards.

- Pods pressed closely against the axis of the raceme, beak small; pods slender, short and smooth ... BLACK MUSTARD.
- Pods spreading away from the axis of the raceme, beak long:—
 - † Pods hairy, rather shorter than the flat beak WHITE MUSTARD.
 - †† Pods smooth, longer than the conical beak:—
 - ‡ Leaves of the stem all narrowed to the base, not clasping the stem:—
 - § Stems short till the flowering shoots form; leaves at the base persisting to form a loose cabbage; stem-leaves never lyrate lobed:—
 - ¶ Margin of leaf deeply irregularly toothed, midrib very much expanded and thickened; leaves green ... PASÁF.
 - ¶¶ Margin of leaf slightly finely crenate or almost entire, midrib narrower, leaves covered with bloom ... LÁHÍ SÍE,
 - §§ Stems elongating from the commencement of growth; leaves at the base quickly withering; most of the stem-leaves lyrate lobed RÁÍ.
 - ‡‡ Leaves of the stem all wide at the base, at least the upper ones clasping the stem:—
 - § Stems elongating from the commencement of growth, leaves at base quickly withering, all the stem-leaves clasping the stem:—
 - ¶ Leaves with hairs, at least when young, densely covered with a pale greyish bloom:—
 - † Root stout spindle-shaped, woody; pods slender, beaded opposite the seeds ... CHITTAGONG "MUSTARD."
 - †† Root slender, tapering; pods stout, not beaded opposite the seeds ... SARSON.
 - ¶¶ Leaves without hairs, green above, with a faint bloom beneath, smaller and less lobed:—
 - † Root slender, tapering, woody ... TORI.
 - †† Root stout, turnip-shaped, esculent ... BHUTIA RÁÍ.
 - §§ Stem short till the flowering shoots form, leaves at the base persisting to form a loose cabbage; only the uppermost stem-leaves clasping the stem PAK-CHOI.

Black Mustard.

A.—BLACK MUSTARD.

- BRASSICA NIGRA** Koch in *Rechl. Deutschl. Flora*, ed. iii. iv. 713; *H.f. & T. Journ. Linn. Soc.*, v. 156; *Flor. Brit. Ind.*, i. 156; *Watt Dict.*, i. 530.
B. sinapoides Roth. *Man.*, ii. 957.
Sinapis nigra Linn. *Sp. Pl.*, 688; *DC. Prodr.*, i. 218; *Wall. Cat.*, 4790.
S. erysimoides Roxb. *Hort. Beng.*, 48; *Flor. Ind.*, iii. 123.

This, the true mustard, is not cultivated in Bengal, and indeed is very little grown or known anywhere in India.

The flour obtained by grinding the seeds, imported and known as "Europe Mustard," is used as a condiment by foreign residents and in hospital practice for poultices. The expressed oil is also used medicinally. The oil is not, in the writer's opinion, so good for this purpose as the oil of "Indian Mustard"; the prevalent idea to the contrary is the outcome of a Western prejudice. The use of the flour as a condiment is, it must be feared, rather hypothetical, at least if English mustard be employed. To begin with, English mustard seeds are first husked. This explains why even pure English mustard is paler than French mustard. But it also explains why the best English mustard is of such poor quality as compared with French mustard, the flavour and pungency of mustard residing largely in the husk. The reason why the husk is removed from English mustard is mainly a trade custom: the trouble is taken, it need hardly be said, more in the interest of the dealer than of the consumer. The paler colour enables the admixture of "white-mustard" flour, which is commercially a much inferior article, to take place without giving rise to inconvenient questions. And in the case of some English mustards what first catches the eye on opening a box is a printed declaration to the effect that the contents are a mixture of pure mustard with farina and choice condiments. What the 'choice condiments' may be, the writer does not know.

Dr. Watt (see *Dict. Econ. Prod.*, i. 530) finds that a large number of vernacular names are applied to *Brassica nigra*. With hardly an exception, however, these names are usually applied to other plants. This is particularly true of the Hindi name *Asl-rāi*, the accurate use of which is limited to "Indian" mustard (*B. juncea*), and of the Bengali name *rāi sarisha*, the use of which is also strictly limited to *rāi* or "Indian" mustard (*B. juncea*). From the absence of any really distinctive name it may be safely concluded that

Cabbage Mustard.

C.—PASAI, PALANGI, OR PAHARI RAI; BADISHA LAI,
OR BHOTIYA LAI.*BRASSICA RUGOSA* Prain. [*B. rugosa* var. *typica* Prain.]

B. juncea H. f. & T. *Journ. Linn. Soc.*, v. 170; *Flor. Brit. Ind.*, i. 157 in part; excluding the RAI plant and also excluding *Sinapis obovatifolia* R. & B.

B. chinensis Duthie & Fuller, *Field and Garden Crops*, ii. 31, not of Linn.

[*B. dentata*, Wall. *Mss.* (*B. rugosa* var. *agrestis* Prain.)]
Sinapis rugosa R. & B., *Hort. Beng.* 48; *Flor. Ind.*, iii. 122.

Moutarde de Chine à feuille de Chou—Filmorin, *Les Plantes potagères*, 356.

A cold-weather crop in the Western, Central, and Eastern Himalaya of annual herbs with very short stocks till the plants begin to flower, and with permanent radical leaves, forming a loose cabbage-like head, one foot across, resembling the head of a "Leat-Beet" or a "China-Cabbage," afterwards 'shooting' into a tall, stoutish stem 4-6 feet high, its branches ascending to form a narrow pyramidal head 3-10 in. across. *Root* slender, tapering, 6 in. long. *Leaves* very large, the blades of the basal, cabbage forming ones, which are disposed in a condensed spiral, 12-15 in. long, 1-9 in. wide, obovate obtuse or subacute, when young hirato above, the anterior half-margin toothed, the posterior much acinate and tapering to a stalk 3-4 in. long, 1-1.5 in. wide, thick, white and fleshy, continued into the leaf as a broad, white fleshy main-nerve with longitudinal ridges and weak bristles beneath, and breaking fan-wise beyond the middle into many slender white sub-equal veins, the blade proper bright green, and without bloom. *Stem* branching, as soon as it shoots, from the axils of all the leaves above base of the stock; the stem-leaves similar to the basal ones but smaller, decreasing upwards, all without stalks and never stem-clasping; the branches also leafy, but more slender and shorter than main stem, their leaves smaller and less lacinate towards base, sub-acute at the tips and with again smaller branches in their axils. *Flowers* in short cymes, about 1.5 in. long when the lowest flower opens, frequently elongating into racemes 8 in. long, with equal slender stalklets 6-7 in. long, slightly spreading, but not elongating in fruit, without bracts or bractlets.

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Cabbage Mustard.

Sepals slightly spreading, .2 in. long, .08 in. wide, still green at time of falling. *Corolla* .6 in. across, petals with a pale-green, narrow claw .12 in. long, and a bright-yellow, spreading, regularly chovoid blade .25 in. long and .2 in. across, faintly greenish-veined beneath. *Pods* 2-valved, including the beak 1.26—1.5 in. long, .2 in. thick; beak narrowly conical, .25 in. long; valves convex, rigid, thinly leathery, faintly beaded opposite the seeds, with a strongish midrib prominent outside, and with rather distinct looped veins on each half-valve. *Seeds* 7—10 under each valve, spherical, brown, finely rugose, hilum the colour of the remainder of the testa; cotyledons yellow.

DARJEELING DISTRICT: Kalimpong (*Rai*! Rungbee, etc., 2—6,000 feet (*Pasii*, *Paangi* or *Pahuri Rai*)!

The cultivation of this plant appears to be usual in Nepal, whence Buchanan-Hamilton sent seeds of it to the Calcutta Botanic Garden in 1802. Hamilton informed Roxburgh that the seeds came from Tibet; Nepalese settlers have carried the plant westward along the Himalaya to Kamaon, and eastward to British Bhutan. This mustard is well described and figured by Vilmorin as "Chinese cabbage-leaved mustard," and it is not impossible that a Chinese plant referred to by Forbes and Hemsley as a variety of *S. juncea* (*Journ. Linn. Soc.*, xxiii. 47), which is "cultivated in immense quantities, and after drying in the sun is pickled and eaten with rice," may be the same. It is, however, just as likely to be the next one.

This, Mr. Pantling notes, is cultivated both as a vegetable and in order that oil may be extracted from the seeds. When left alone it forms a fine loose cabbage exactly as in Vilmorin's figure, reproduced in Plate I (fig. 1). It is an early cold-weather crop in the hills, and is grown more for the leaves than for the seeds. The leaves are plucked almost as fast as they are developed, so that by the time the flowers are produced, none or next to none remain on the stems.

As regards the systematic position of this plant, the writer agrees with Hooker and Thomson in deeming it a member of the group of forms to which *S. juncea* (*Asi-Rai*, or "Indian mustard") belongs. But it is impossible to assent to its reduction, unless as a sub-species, to *S. juncea*. It is, as we know, highly probable that India owes *S. juncea* (the *Asi-Rai*) to China, and it seems likely that the route followed by the *Asi-Rai* on its way to Bengal and Upper India has been that across the north-east frontier and along the valley of Assam. At all events the "agrestal" plant named *Sinapis patens* by Roxburgh, which, though quite wild, is nevertheless not

Cabbage Mustard.

botanically separable from his *S. juncea*, is far commoner along that route than it is in the plains of India.

But *B. rugosa*, if it be a derivative of the stock from which *B. juncea* has originated, is a derivative of long standing. Not only has it probably originated in China and been introduced in its present form to the Central Himalayan region through Tibet, in India, at all events, it shows no inclination to revert to a form approaching *B. juncea*. On the contrary, we are indebted to Dr. Watt for the interesting discovery that in Manjūr there is an "agrestal" plant, for which he has proposed the name *B. dentata*, which, though quite wild, is not botanically separable from Roxburgh's *Sinapis rugosa*, and which we cannot by any stretch of the imagination identify with Roxburgh's *Sinapis juncea*. In other words, *B. rugosa* cannot be included in *B. juncea* even as a separate variety. It constitutes what may be termed a species of secondary rank, or a sub-species, according to the standpoint from which the problem is viewed. In a monograph of the genus *Brassica* it would doubtless be sufficient to treat *B. rugosa* as a sub-species related to *B. juncea*, precisely as *B. Napus* and *B. Rapa* are related to *B. campestris*. In a note like the present it is obviously better to treat it, just as *B. Napus* and *B. campestris* are treated, as a distinct species. The precise relationship is shown in the systematic conspectus that follows this chapter.

The most interesting feature about *B. dentata* Watt (*B. rugosa* VAR. *agrestis*), is that it combines exactly the foliage of true *B. rugosa* with a somewhat different habit of growth, the root-leaves forming a rosette rather than a cabbage.

EXPLANATION OF PLATE I.

BRASSICA RUGOSA Prain.

(*Sinapis rugosa* Roxb.)

1. Plant before flowering, about $\frac{1}{4}$, after Vilmorin.
2. Portion of stem after flowering has commenced, with stem-leaf, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
- 3, 4. Portions of a flowering branch, $\frac{1}{2}$; from Roxburgh's original drawing.
5. Unripe capsule, $\frac{1}{2}$; from Roxburgh's drawing.
6. Ripe capsule, $\frac{1}{2}$; from Roxburgh's drawing.
7. Seed; enlarged; from Roxburgh's drawing.

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Cabbage Mustard.

D.—LAHI SAG.

BRASSICA RUGOSA VARI. *CUNEIFOLIA* Presl.

B. juncea H. f. & T. *Journ. Linn. Soc.*, v. 170; *Flor. Brit. Ind.*, i. 137, in part; *excluding the Aul-Rai plant and also the synonym Sinapis rugosa* Roeb.

Sinapis cuneifolia Roeb. *Hort. Beng.* 48; *Flor. Ind.*, iii. 122.

A cold-weather garden crop, in Northern Bengal and in Assam, of annual herbs with tall much-branched erect stems 4-6 feet high, the branches ascending to form a wide pyramidal head 1.5-2 feet across. Root stout, swollen, 6-8 in. long. Leaves large, the basal ones soon withering, their blades 12-15 in. long, 4-6 in. wide, obovate, the point subacute, tapering from beyond the middle to a stalk 2 in. long, .35 in. wide, channelled above, not ridged, continued into the leaf as a slender tapering midrib, giving off at intervals 10-12 pairs of lateral nerves, glabrous above even when young, with very few bristles beneath, the blade proper glaucous, the margin finely serrate. Stem branching from the axils of the 4th or 5th leaf upwards, these stem-leaves similar to the basal, but smaller, decreasing upwards; all without stalks, and never stem-clasping; branches always leafy, nearly as strong and long as main stem, and often again branching; stem and branches with a slight bloom, and more or less tinged with purple, especially near the nodes. Flowers in short corymbs, about 1.5 in. long when the lowest flower opens, subsequently elongating into racemes 5-6 in. long, with equal slender stalklets .4-5 in. long, slightly spreading but not elongating in fruit, without bracts or bractlets. Sepals slightly spreading, 2 in. long, .08 in. wide, still green at time of falling. Corolla .5 in. across, petals with a pale-green, narrow claw .15 in. long and a bright-yellow, spreading, suborbicular blade .2 in. long and broad, very faintly veined. Pods 2-valved, including the beak 1.25-1.5 in. long, .2 in. thick; beak narrowly conical, .25 in. long; valves convex, rigid, thinly leathery, faintly beaded opposite the seeds, with a strongish midrib prominent outside, and with rather distinct looped veins on each half-valve. Seeds 7-10 under each valve, spherical, brown, finely rugose; hilum the colour of the remainder of the testa; cotyledons yellow.

Like the preceding, this was sent to the Calcutta Garden from Nepal by Buchanan-Hamilton in 1802, and, as in the other case (so, at least, Roxburgh notes) Hamilton got

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the seeds from Tibet. However, there is no trace of the cultivation of this kind among the Nepalese settlers in the Eastern Himalaya at the present time, and there is just the possibility of some mistake as to the locality whence the seeds came, because this appears to be one of the staple crops in Dinajpur, Rangpur, and Bogra—districts that were carefully economically surveyed by Buchanan-Hamilton at the beginning of the century, and whence it is possible the seeds may have been obtained. Its cultivation also extends, Dr. Watt finds, into the valley of Assam, and if limited to, seems to be co-extensive with, the area occupied by races that are of a Cachari, or, as in North Bengal they are usually termed, a Rajbanshi stock.

It is a garden, not a field, crop. This may explain why the Department of Land Records did not communicate seeds. Dr. Watt's field-notes describe the cultivation of the plant and the use of its leaves in terms identical with those used by Mr. Pantling in describing the culture and use of *B. rugosa*.

This plant, Roxburgh's *Sinapis chinensis*, has been reduced, like the preceding, by Hooker and Thomson to *Brassica juncea*. It is nearest, of the Indian forms, to *B. rugosa*, the flowers and fruit and seeds are practically identical with those of *B. rugosa*, and differ, especially the fruits, rather markedly from those of *B. juncea*. But the swollen root, the glaucous stem, and the rather smaller petals seem to indicate that this is at least variably separable. No apetal form of this, corresponding to *B. dentata* or *B. potens*, has been met with as yet.

Hooker and Thomson, and again Forbes and Hemslay (*Journ. Linn. Soc.*, xxiii. 47) have reduced *Sinapis chinensis* (Linn.) to *B. juncea*. Duthie and Fuller, on the other hand, identify *S. chinensis* (Linn.) with *Barbaba Rot*, which is *S. rugosa* Roxb.; this, in spite of Hooker and Thomson having reduced *S. rugosa* to *B. juncea*, is not quite the same thing. The matter must be left for the present as somewhat doubtful. Linnaeus and Willdenow both state that *Sinapis chinensis* has small white flowers; either reduction must therefore have been put aside as 'suspicious,' were it not for the fact that De Candolle notes (*Prodr.*, ii. 219) having actually seen a specimen of *S. chinensis* in the Paris Herbarium, and says that its flowers are very like those of *S. juncea*. If one or other of the reductions be necessary, it seems as if that proposed by Hooker and Thomson, not that proposed by Duthie and Fuller, must be the correct one. In any case, even if the identification indicated by Duthie and

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Fuller could be sustained, the name *Brassica chinensis* proposed by them is not available. There is already a different *Brassica chinensis* Linn. (the China Cabbage), older as a name than the same author's *Sinapis chinensis*.

EXPLANATION OF PLATE II.

BRASSICA RUGOSA var. *CUNCIFOLIA* Prain.

(*Sinapis cuncifolia* Roxb.)

1. Radical leaf, $\frac{1}{2}$, reduced from Roxburgh's original drawing.
- 2, 3. Portions of a flowering-branch, $\frac{1}{2}$, from Roxburgh's drawing.
4. Flower, $\frac{1}{2}$; from Roxburgh's drawing.
5. Unripe capsule, $\frac{1}{2}$, from Roxburgh's drawing.
6. Ripe capsule, $\frac{1}{2}$; from Roxburgh's drawing.
7. Seed, enlarged from Roxburgh's drawing.

E.—ASI-RÂI OR INDIAN MUSTARD.

BRASSICA JUNCEA H. & T. *Journ. Linn. Soc.* v. 170; *Flor. Brit. Ind.* i. 157; *Forbes & Hemsal Journ. Linn. Soc.*, xxiii. 47; *Duthie & Fuller, Field and Garden Crops*, ii. 33; *Watt, Dict.*, i. 528.

Sinapis juncea Linn. *Sp. Pl.* 663; *DC. Prodr.*, i. 218; *Franch. Pl. Durai.* i. 40.

S. ramosa Roxb. *Hort. Beng.*, 48; *Flor. Ind.*, iii. 119.

S. chinensis Linn. *Mant. Pl.* 95; *Artuin, Sp.* i. 23, t. 10; *DC. Prodr.*, i. 219; not *Brassica chinensis* Linn.

S. patens Roxb. *Hort. Beng.*, 48; *Flor. Ind.*, iii. 124 (*Brassica juncea* var. *agrestis* Prain).

A cold-weather crop in the plains and in the lower Himalaya of tall, annual, much-branching erect herbs 3-6 feet high, the branches ascending and forming a wide pyramidal head 1-1.5 feet across. Root slender, tapering, 6 in. long. Leaves large, the blades of the basal 6-8 in. long, 2-4 in. wide, sinuate-lyrate, tapering to a stalk 1-2 in. long, decreasing upwards, those in the upper third of the stem 2-2.5 in. long, 1.5 in. wide, with entire margins, bright green and without bloom. Stem branching from the axils at the 4th or 5th leaves upwards, all branches about as long as continued main stem and often again branching, usually more or less tinged with purple, especially near the joints; the leaves after branching commence oblanceolate with

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an acute tip and a narrowly cuneate base, gradually tapering backwards from the middle. Flowers in short corymbs about 1 in. long when the lowest flower opens, subsequently elongating into a raceme 8 in. long, with equal slender stalks 6-7 in. long, without bracts or bracteoles, slightly spreading and increasing, as the fruit ripens, to 2 in. in length. *Sepals* slightly spreading, 2 in. long, .98 in. wide, green, becoming yell. with before falling. *Coriola* .6 in. across; petals with a pale-green, narrow claw .12 in. long and a bright-yellow, spreading, regularly-ovaloid lobe .25 in. long, .2 in. across, faintly green-veined beneath. *Pist.* 2-valved, including the beak 2.25-2.5 in. long, .2 in. thick; beak narrowly conical, .4 in. long, valves convex, rigid, thinly leathery, distinctly beaked opposite the siliola, with a straight string midrib, prominent outside, and with rather strong prominent looped veins on each half-valve. *Sili.* about 20 under each valve, spherical, brown, finely rugose; like the colour of the remainder of the testa; cotyled. as yellow.

There are three more or less distinct forms of *Asiatic* cultivated in the Lower Provinces. They are quite easily distinguished when growing side by side, but the characters are not very tangible except in the living plant, and are certainly not of varietal, perhaps hardly even of racial value. The forms are—

1. TALL EARLY RAIL; genuine *Bur.* *Leaves* near base of stem with a few hairs beneath, upper with none. *Stems* 5-6 feet high; fruit *ripening* about middle of February.

Cultivated generally throughout the Lower Provinces; samples have been received from Tirhut, South Bihar, Orissa, Western, Northern and Eastern Bengal. No sample has been sent from Chota Nagpur or from Chittagong.

2. ROUGH EARLY RAIL. *Leaves* all more or less hairy beneath. *Stems* 3-4 feet high, green or very faintly purple, fruit *ripening* in beginning of February.

Cultivated fairly generally in the central part of the Lower Provinces. Samples have been received from South Bihar, Western and Northern Bengal; none have come from Tirhut, or Chota Nagpur, or Orissa, and none have been sent from East Bengal. One sample was sent from Chittagong, but it is apparently a recently introduced plant in that district (see next paragraph).

3. SMOOTH EARLY RAIL. *Leaves* all quite destitute of hairs beneath. *Stems* 3-4 feet high, more darkly purple than in the other two forms; fruit *ripening* in beginning of February.

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Much more limited even than the preceding, though apparently fairly commonly cultivated in Tirhut, South Bihar, and Western Bengal. It appears to be unknown in North and East Bengal and in Orissa, and practically unknown in Chittagong, for the only sample sent from that district was a mixture of this and of "Rough early." It is also practically unknown in Chota Nagpur, the only sample sent from that Division being a mixture of this "Smooth early" form and of *Sarson*.

As a whole, *Rai* may be said to be a general crop everywhere in the Lower Provinces, except Chota Nagpur, where it is practically unknown, and Chittagong, where it may have been only recently introduced. The explanation doubtless is that in Chota Nagpur *Tori* (there termed *Lutan*) replaces *Rai*; in Chittagong *Ai-Rai* appears to be replaced by a special mustard peculiar to the district.

In the *Hortus Bengalensis* Roxburgh gives *Juni-rai* as the vernacular name. It is interesting to find, eighty years afterwards, that this name is still used within twenty miles of the Royal Botanic Garden; it is, however, curious that the name is not reported from any but the Hooghly district. Roxburgh has written the name *Juni* also on the figure of *Sinapis ramosa* in his *Lunes Ineditæ*, with the later additional note:—"The same came up equally with the Purnea *Torre*." By the time the manuscript of the *Flora Indica* was prepared, Roxburgh had, however, ascertained what the facts of the case really were, and uses for his *Sinapis ramosa* its true name *Rai*.

By an accident already alluded to, the notes stating the native names and qualities of *B. juncea* and *B. campestris* have been transposed in Hooker and Thomson's original account of the Indian *Brassicæ*, much to the discomfiture of non-botanical consultants of the paper.

Sinapis patens Roxb., properly given as *Beel-rai* in the *Hortus Bengalensis*, by an error of the printer *Keel-rai* in the *Flora Indica*, is a weed of cultivation in Bengal which Hooker and Thomson refer to *Brassica juncea* in their original paper. In the *Flora of British India*, i. 167, these authors say it is a *Nasturtium*, though they do not account for it under *Nasturtium*. That the first reduction which Hooker and Thomson proposed is a just one seems to be undoubted; there is not a single essential character by which *S. patens* can be separated from *Rai*. At the same time, it is (1) perfectly certain that this is not merely *Rai* springing up in fields from dropped seeds, and it is (2) highly probable that this does not represent the original wild stock whence *Rai* has

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been derived; it appears to be rather a degenerate subferal escaped condition of the cultivated *Rai*. One of its most marked peculiarities as compared with *Rai*, besides its smaller size, is the habit it has acquired of appearing during the rains, though it does not flower till the cold season. The plant does not appear to extend further west than Central Bengal, and even there and in Eastern Bengal it is far from common. In the Khasia, the Naga and the Kachin Hills, however, it is of quite frequent occurrence: there it flowers from March to May. It is probable that the *Sinapis chinensis* of Linnaeus and of Ardoin is this particular form.

The writer therefore proposes to treat *Sinapis patens* as a distinct retrograde variety of *Rai*: it may be best known as *Brassica juncea* var. *agrestis*. It has already been pointed out that Dr. Watt has discovered in Mampur a similarly distinct retrograde variety of *Brassica rugosa*, occurring in fields as a weed of cultivation.

The detailed distribution of the three forms of *Ar-râi* cultivated in Bengal, as shown by samples sent to Silpur, is given in the subjoined table along with the names that accompanied each sample. The general distribution is indicated in Map I, Section A. The following special remarks are called for in connection with this list:—

The sample sent as *Râi* from Singbhum was a mixture in almost equal parts of *Râi* and *Sarson*. Only one other sample was sent as *Râi* from any part of Chota Nagpur. It came from Hazaribagh; it proved to be *Tori*, not *Râi*.

The "small *Râi*" of Chittagong, of which only one sample was sent, consisted of about equal parts of rough and smooth short *Râi*. They ripened, however, rather later than any of the plots of either kind, and were about as 'late' as the tall *Râi* of the first column. The *Râi sarisha* of Midnapore was also a mixture of the two short forms. Both, however, ripened early. Another sample from Midnapore of clean 'short, smooth, early' had a distinctive name. The term *chota*, applied to the sample from Orissa, had reference to the seeds, for the *tara sarisha* from Angul was a form of *Tori*, a much smaller plant, but with larger seeds.

The seeds of the plants grown in the Silpur Farm were very uniform in all the samples, whatever the district of origin. They were in every case rather smaller than the original seeds supplied from Tirhut or South Bihar, but not than those sent from Bengal Proper and Orissa.

Details of *Eri*DETAILS OF SAMPLES OF *Eri*

Cultivated at Silper Experimental Farm, 1864-57.

	Tall, slightly rough, late.	Short, smooth, early.
TERRUT.	... <i>Eri</i> ?	... <i>Eri</i> ?
	... <i>Eri</i> ?	... <i>Eri</i> ?
S. ERIAR.	Shahabad (Bhujpur) ... <i>Eri</i> ?	Shahabad (Bhujpur) ... <i>Eri</i> ?
	... <i>Eri</i> ?	... <i>Eri</i> ?
	... <i>Eri</i> ?	... <i>Eri</i> ?
CHOTA NAOPUR.	... <i>Eri</i> ?	... <i>Eri</i> ?
	... <i>Eri</i> ?	... <i>Eri</i> ?
ORIAL.	... <i>Eri</i> ?	... <i>Eri</i> ?
	... <i>Eri</i> ?	... <i>Eri</i> ?

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grown at Sibpur.

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Southal Parganas ... Rd.	Southal Parganas	Gola	Southal Parganas	Man sarika
Houghly (Serampore) ... Rd.	Banura	... Rd.	Midnapore	Man sarika
" (Jharkhand) ... Rd.	St. Parganas	... Rd.		
	Burwan	... Rd.		
Jessore ... Rd.		... Rd.		
" ... Rd.	Murshidabad	... Rd.	Nadia	Rd.
Purnea	Purnea	... Rd.		
Jalpaiguri (Phulki) ... Rd.	Jalpaiguri (Pargana) ... Rd.	... Rd.		
Raipur ... Rd.		... Rd.		
Bachaul ... Rd.		... Rd.		
Phulki ... Rd.		... Rd.		
Dacca ... Rd.		... Rd.		
Faridpur ... Rd.		... Rd.		
Mymensingh (Sadar) ... Rd.		... Rd.		
" (Jalpaiguri) ... Rd.		... Rd.		
" (Narail) ... Rd.		... Rd.		
Bakergunge (Narail) ... Rd.		... Rd.		
" (Saidpur) ... Rd.		... Rd.		
Tripura ... Rd.		... Rd.		
	Man sarika	... Rd.		
	Man sarika	... Rd.		

N. BENGAL.

E. BENGAL.

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CHITTAGONG.

Colza.

EXPLANATION OF PLATE III.

BRASSICA JUNCEA Hook. fil. & Thoms.

(Sinapis ramosa Roxb.)

1. Radical leaf, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
2. Portion of stem with leaf and branch, $\frac{1}{2}$; from Roxburgh's drawing.
3. Flowering branch, $\frac{1}{2}$; from Roxburgh's drawing.
4. Fruiting branch, $\frac{1}{2}$; from Roxburgh's drawing.
5. Capsule, $\frac{1}{2}$; from Roxburgh's drawing.

F.—COLZA, OR CHITTAGONG "MUSTARD."

BRASSICA CAMPESTRIS Linn. *Sp. Pl.*, 666; DC. *Syst. Veg.*, ii. 592; Eng. *Bot.* t. 2146.B. campestris VAR. oleifera DC. *Prodr.*, i. 214.

A cold-weather crop, only reported from Chittagong, of tall annual herbs 4-5 feet high, branching freely from the axils of the radical leaves in a wide bushy head 2-3 feet across. *Root* stout oblong 6-8 in. long, thickly spindle-shaped, 1-1.5 in. in diameter, fibrous rooted in the lower part, the upper part projecting above ground. *Leaves* large, the radical and those of the lower half of stem lyrate-pinnatifid, 6-14 in. long, the end lobes ovate-cordate 3-4 in. long, 2-3 in. wide, the other lobes along the slender petiole-like main-nerve very small; in the upper third of stem oblong lyrate-sinuate 2.5-3 in. long—all to the very base lyrate and stem-clasping, pale with much bloom on both sides and with some hairs beneath. *Stem* and basal branches subequal all again freely branched, glaucous and tinged with purple, especially at the joints. *Flowers* in oblong corymbs about 2 in. long when the lowest flower opens, subsequently elongating into a raceme 8-16 in. long with equal pedicels .75 in. long, slender ascending, in fruit elongating to 1.5 in., without bracts or bractlets. *Sepals* suberect, inner pair .25 in. long, exceeding outer .2 in. long, all .15 in. wide, glaucous, becoming yellow before falling. *Corolla* .4 in. across, petals with a yellow claw .15 in. long and a bright yellow obovate, ascending blade .25 in. long, .2 in. wide. *Pods* 2-valved, including beak 2.25-2.5 in. long, .2 in. thick; beak slender, conical, .5 in. long; valves convex, thinly leathery, distinctly beaded opposite the seeds; nerves outside rather slender and indistinct. *Seeds* 15-20 under each valve, spherical, bright brown, smooth; hilum the colour of the remainder of testa; cotyledons yellow.

CHITTAGONG: (sent simply as "Mustard.")!

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Colza.

This is the only plant among the samples sent to the Silpur Farm that does not accord with any of the mustards mentioned or described in Indian works on Botany. The sample was a mixed one; the plot produced the above plant, and the more dwarf and early form of *Tori*, in about equal amount. It would almost seem as if mustard cultivation were of recent introduction in the Chittagong district, and it would be interesting to ascertain how it chances that a plant so like genuine *Colza* should have found its way into Chittagong without reaching Bengal or Bihar.

Though all the Chittagong "*Colza*"-like plants were annual, flowering freely and producing an abundance of seed, their thick roots seemed to suggest that in a more temperate environment they might readily develop, if indeed they had not formerly possessed, the biennial habit so usual in true *Colza*, and so characteristic of the cultivated Navews and Rutabagas, and of the turnips both Swedish and genuine. Indeed, till such time as the flowering branches began to appear in the axils of its radical leaves, this Chittagong plant resembles so closely, both in foliage and in root, the corresponding stage of the Swedish turnip (*Brassica campestris* var. *napo-rusticata*) commonly cultivated in Northern Europe, that the writer was inclined to think some mistake had occurred; the same thought evidently occurred to the overseer of the farm who remarked that surely this was a *shalgam* (turnip), not a *sarisha* (mustard). So soon as the plant flowered, however, its true nature was apparent. But while admitting it to be no turnip, the native overseer still insisted that the plant was one he had not before seen either in Upper India or in Bengal.

EXPLANATION OF PLATE IV.

BRASSICA CAMPESTRIS Linn. var. *OLEIFERA* DC.

1. Plant before flowering, about $\frac{1}{2}$; from an example cultivated at the Silpur Experimental Farm, raised from seed received from Chittagong.
2. Radical leaf, $\frac{1}{2}$; ditto.
Secondary branch again branching, $\frac{1}{2}$; ditto.
3. Flowering branch, $\frac{1}{2}$; ditto.
5. Flower before fully opening; $\frac{1}{2}$; ditto.
6. Fully-opened flower, half cut away. $\frac{1}{2}$; ditto.
7. Two of the longer stamens, $\frac{1}{2}$; ditto.
8. Young fruit, $\frac{1}{2}$; ditto.
9. Ovule, enlarged; ditto.
10. Capsule, $\frac{1}{2}$; ditto.

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G.—SARSON, or INDIAN COLZA.

BRASSICA CAMPESTRIS Linn., var. *SARSON* Prain.

- B. *glauca* Willm. ex Hook. in *Kew Report* for 1877, p. 34.
 B. *campestris* H. f. & T. *Journ. Linn. Soc.*, v. 169, in part.
 B. *campestris* subsp. *Napus* H. f. & T., *Flor. Brit. Ind.*, i. 156, in part.
 B. *campestris* subsp. *Napus* var. *glauca* Duthie & Fuller, *Field and Garden Crops*, ii. 28.
 B. *campestris* subsp. *Napus* var. *trilocularis* Duthie & Fuller, *Field and Garden Crops*, ii. 28.
 B. *campestris* subsp. *Napus* var. *quadrivalvis* Duthie & Fuller, *Field and Garden Crops*, ii. 29.
 B. *trilocularis*, H. f. & T. *Journ. Linn. Soc.*, v. 170; *Flor. Brit. Ind.*, i. 156.
 B. *quadrivalvis*, H. f. & T. *Journ. Linn. Soc.*, v. 169; *Flor. Brit. Ind.*, i. 156.
 B. *campestris* subsp. *campestris* var. *glauca* Watt, *Dict.*, i. 524.
 B. *campestris* var. *glauca* *Kew Bulletin* for 1894, p. 96.
Sinapis glauca Roxb., *Hort. Beng.*, 45; *Flor. Ind.*, iii. 118.
 S. *trilocularis* Roxb., *Hort. Beng.*, 48; *Flor. Ind.*, iii. 121.

A cold-weather crop of tall annual herbs 4-5 feet high, rather rigid and unbranched or branching to form a narrowly pyramidal head 1-1.5 feet across. Root thickish, tapering, 6-8 in. long. Leaves large, the lower lyrate-pinnatifid 6-8 in. long, 2-3 in. wide, decreasing upwards, those in upper third of stem oblong lyrate-sinuate to lanceolate, obtuse or subacute, entire, 2-5-3 in. long—all except the lowest 2-3 auricled and stem-clasping, pale, glaucous with at first some hairs beneath. Stem rarely branching from the 4th-5th leaf, usually only higher up, branches subfastigate usually shorter than main stem, or stem often unbranched. Flowers in oblong corymbs, about 2 in. long when lowest flower opens, subsequently elongating into a raceme 8-16 in. long with subequal ascending slender pedicels .75 in.

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long, without bracts or bractlets, slightly elongating in fruit, at which time they may be thickened and suberect, or remain slender and become decurved. *Sepals* suberect; inner pair .25 in. long, exceeding the outer pair .3 in. long—all .15 in. wide, glaucous, becoming yellow before falling. *Corolla* .4 in. across; petals with yellow claw .15 in. long, and bright yellow, obovate ascending blade .3 in. long, .2 in. across. *Pods* various; normally .4 in. wide, broader than thick, 2-valved and 2-chambered; in abnormal forms as thick as wide, by lateral expansion of one or both seed-bearing ribs (placentæ) spuriously 3-4-valved, and then by absorption, lateral displacement, or doubling of the partition variously 1-, 2-, or 3-chambered; in erect-fruited forms *Pods*, including beak, 2 in. long if 3-4-valved, to 2.5 in. if 2-valved; in pendent-fruited forms 3-3.25 in. long; beak conical, stout, often 1 in. long; valves thickly leathery, with a weak midrib and indistinct looping nerves on each half-valve. *Seeds* varying from 30-80 in a pod, subapical, dingy white, yellow or brown, almost smooth, cotyledons pale yellow.

There are three different characters by which it has been proposed to break up the *Sarson* crop into races, varieties, even species. These are—

- (1) The colour of the seeds.
- (2) The number of valves and chambers in the pod.
- (3) The direction of the stalks when the fruits are ripe.

They are worthy of consideration in detail.

COLOUR OF SEEDS.—In the majority of our Bengal districts only white-seeded forms of *Sarson* are cultivated; this is also the case in Chota Nagpur. In most of our South Bihar and Tirhut samples a certain number of brown *Sarson* seeds are always found, but even in these samples the proportion of white seed greatly exceeds the proportion of brown, which has only in one sample exceeded 15 per cent. of the whole. Among the 143 samples received at Silpur, only one sample consisted of unmixed brown-seeded *Sarson*. This sample was received from the Dumraon Experimental Farm, and it does not therefore follow that it is cultivated anywhere in our area. So far, then, as Bengal is concerned, the character obtained from colour of seeds is not of practical importance in subdividing *Sarson*. But we have ample proof that this character is of very little real value, for Mr. Duthie has sent to Calcutta examples of a *Sarson* from Khari in Oudh, where it is known as *Sarson Zard*, in which yellow seeds and brown seeds occur on the same specimen!

Indian Cohn.

NUMBER OF VALVES AND CHAMBERS.—The number of valves, although the character has been used by Hooker and Thomson to separate one form of *Sarson* as a species (*B. quadrivalvis*), possesses no greater value than the character of colour of seed. Among the 45 plots of *Sarson* cultivated by the writer, 19 were what may be termed *Asi-Sarson* or *Sarson* with pods of the normal *Brassica* type, almost erect, 2-chambered from the presence of a complete partition extending from placenta to placenta, and with only 2-valves, the width of the valves rather exceeding the thickness of the pod. On the other hand, six plots contained plants that had pods very regularly 4-valved, with the partition quite absent (PLATE VII, figs. 2, 7); occasionally pods were found that had a partition present, but only towards one side (PLATE VII, fig. 3), and a considerable percentage of such pods had but three valves owing to one of the two seed-bearing ribs (placentae) remaining normal; a few pods were also found in these plots with three chambers owing to the partition being doubled (PLATE VII, fig. 4). These six plots were the only ones that could be looked on as examples of clean *Brassica quadrivalvis* H. f. and T.

There were four other plots of what at first sight appeared to be unmixed *B. quadrivalvis*, where closer examination showed that while all the fruits at the base and throughout the lower two-thirds of the racemes were 4-valved, and had no partition, those towards the top of the racemes were all 2-valved and 2-chambered, as in normal *Sarson*. Among the plants of this plot, 4-valved and 3-valved pods with laterally displaced partitions (PLATE VII, figs. 3, 4) were far more common than among those of the six plots mentioned in the preceding paragraph. And in one very interesting plot, raised from seed received from Arrah as *Jauda Sarson*, the pods seen from outside looked exactly like those of *Brassica 4-valvis*, since they were as broad as thick, and had the seed-bearing ribs expanded till they were almost as wide as the valves. On being opened, however,—and once the discovery was made, many hundreds of pods from several scores of plants were opened—the pods were in every case found to possess a complete and centrally situated partition with the normal number of rows of seeds (PLATE VII, fig. 6).

Which of the two conditions—that where all the pods are to outward appearance 4-valved, and yet in reality are only 2-valved, or that in which one finds every sort of transition between 2-valved and 4-valved pods—is to be deemed the midway stage in the transition from normal 2-valved to **B. 799—855.**

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specialized 4-valved *Sarson*, and which may be looked on as a reversion from the unnatural 4-valved to the normal 2-valved state must remain an open question. Between them, however, they seem to the writer to prove quite satisfactorily that *B. 4-valvis* has no claim to be considered a separate variety, far less a distinct species.

That the 4-valved state is an abnormal deviation from the type goes almost without saying. Its abnormal nature is, however, corroborated by a tendency that exists to further abnormality. Among the large number of pods examined it was found that, of the pods lowest down in the raceme, about 1 per cent. in those plots where all the pods were 4-valved, and about 2.5 per cent. in the plots where the pods were 2-valved below and 4-valved above, afforded examples of the abnormal replacement of one or more seeds by small deformed pods enclosed within the main one (PLATE VII, fig. 8); and among the many hundreds of pods opened by the writer, one was found that exhibited the much rarer abnormality of an axial accessory pod inside the main pod (PLATE VII, fig. 9); as no such abnormality was found in any of the outwardly 4-valved pods with normal partitions and the usual number of rows of seeds, the writer is inclined to think that these last may illustrate a partial reversion from the 4-valved to the normal type, the other conditions being perhaps instances of the evolution of the 4-valved state.

In six other plots the plants were found to consist of about equal parts of 2-valved and 4-valved erect-fruited *Sarson*. In four of these six plots all the 4-valved plants were true to their type; in the other two the instances of transition from the 4-valved to the 2-valved state were marked and abundant.

The question why, supposing we are right in considering the 4-valved state an abnormal one, our Indian farmers should have in an empirical manner, as the cleanness of many of the samples show, in certain districts consciously or unconsciously selected a 4-valved kind of *Sarson*, while no corresponding kind of *Tori* has been produced, does not seem difficult to answer. The object in the case of any crop grown purely for the sake of its seeds must obviously be to get as much seed as possible. This object, as we shall presently see, has in the case of *Tori* been attained by selecting a plant that branches remarkably freely and widely. In the case of *Sarson*, on the other hand, it has been attained by selecting kinds with pods in which the number of rows of seeds is multiplied. To what extent the custom that almost

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universally prevail of growing *Sesoum* along with other crops and of growing *Sesoum* erect, is the cause or the effect of the change in the character, must be left to others to decide.

The number of partitions, and therefore of chambers, in the pod has been used, at least occasionally, in distinguishing still another species—*B. trilobularis*, first separated by Roxburgh and afterwards accepted by Hooker and Thomson. The condition indicated by the name implies the presence of two partitions, and therefore of three chambers (PLATE VII, fig. 11). It is not, however, the rule even in the form to which it gives its name; more often, just as in *B. b-sevis*, we find in *B. trilobularis* only one partition, towards one side; oftener still we find no partition whatever. But though this is the condition which has given *B. trilobularis* its name, the differentiation of the form known as *B. trilobularis* depends in reality on the character next to be considered.

DIRECTION OF THE PODS WHEN RIFE.—The direction of the pods, whether erect or pendent, has been used by Roxburgh, and after him by Hooker and Thomson, as the basis for the separation of another species; *Sinapis trilobularis* Roxb. (*Erasmus trilobularis* H. L. and T.) only differs from *Sesoum* in having pendent pods.

Only five unmixed samples of true *B. trilobularis*, with the pods all down-turned and all 4-valved, were sent for sowing. Other two samples were received, in which *B. trilobularis* and *B. b-sevis* were present in about equal quantity without an appreciable number of deviations from either kind. But it was clearly proved that *B. trilobularis* has no more claim to separate specific, or even varietal rank than *B. b-sevis*; as for there was one plot, the seeds of which were sent from the Southern Pergams as *Porti Seriate*, in which all the plants had pendent pods, but in which many of the plants had the pods towards the tops of the racemes only 3-valved; while in two other plots all the pods were down-turned exactly as in *B. b-sevis*, but all the pods on every plant were only 2-valved. The parallel between the erect and the pendent-fruited *Sesoums* as regards the structure of their pods is, therefore, complete.

Finally, perhaps the most interesting sample of *Sesoum* that was one of which the seed was sent from Nilphamari in Bengoet. Many of the plants that came up in this plot showed all the transitions possible between erect, spreading, and pendent pods. It is true that in their early stages the pods even of genuine *B. trilobularis* are erect, and only become pendent as they ripen. In the plants referred to

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however, the pods toward the top of the stem remained erect when ripe, and in this state, moreover, resembled those of *B. 4-valvis* in being decidedly shorter than the lower pods, which were those of typical *B. 2-locularis*.

Not only this, but neither *B. 4-valvis* nor *B. 2-locularis* specifically separable from *Sarson* proper, the differences between the two are, at most, not more than racial. Using this last character we therefore find that there are two races of *Sarson*—

- (1) *Natur*, erect-fruited, and
- (2) *Uth*, nodding-fruited,

both races passing insensibly from a 2-valved to a 4-valved form.

No *Sarson* of any kind was sent from CHITTAOGONG. Its place there is taken by a quite different plant that does not seem distinguishable from true *Colza*.

1. (a) Erect-fruited, 2-valved *Sarson* is common in SOUTH BIHAR, CHOTA NAOPUR, ORISSA, WEST and EAST BENGAL. But it does not extend north of the Ganges, for not a single sample has been received from TIBHUT or from NORTH BENGAL.

(b) Erect-fruited, 4-valved *Sarson* is, on the other hand, very common in TIBHUT and NORTH BENGAL; but it extends south of the Ganges, for it is common in SOUTH BIHAR, and is also found in the Mymensingh district of EAST BENGAL. It seems, however, to be quite unknown in CHOTA NAOPUR, ORISSA, or WEST BENGAL, and is not sent from any part of EAST BENGAL except Mymensingh.

2. (a) Nodding-fruited, 2-valved *Sarson* is almost strictly confined to NORTH BENGAL.

(b) Nodding-fruited, 4-valved *Sarson* occurs also in NORTH BENGAL, and is mainly confined to that region. But it is also reported from SOUTH BIHAR (Arrah) and from the neighbouring district of Palamau in CHOTA NAOPUR, while from the Sindhal Parganas in WEST BENGAL is reported, under the name *Poti* (Eastern) *Sarisa*, a transition from the 4-valved to the 2-valved state, or *vice versa*, of nodding-fruited *Sarson*.

That the *Sarsons* above described constitute in the botanical sense only different forms of the same plant will be sufficiently apparent from what has been said above, even to those who are not familiar with the *Sarson* crop in all its stages.

The proper treatment to be accorded to them is not, however, at first so clear. Roxburgh treated erect-fruited 2-valved *Sarson* as one species (*Sinapis phoenicea*) and nodding-

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fructed 4-valved *Sarson* as another (*S. trilobata*). But erect-fructed 4-valved and nodding-fructed 2-valved Roxburgh neither describes nor names. Hooker and Thomson, following Roxburgh, make nodding-fructed 4-valved a species (*Brassica 3-lobata*); they further treat erect-fructed 4-valved as a second species (*B. 4-valva*). Like Roxburgh, they omit nodding-fructed 2-valved altogether, and erect-fructed 2-valved they unite with Roxburgh's *Sinapis dichotoma*, treating both as referable to *Brassica campestris* var. *Napus*, without separating them from typical *B. Napus* or from each other even as varieties.

Duthie and Fuller separate erect-fructed 2-valved *Sarson* from *B. Napus* and also from *Sinapis dichotoma* as a distinct variety, var. *glauca*. They at the same time treat both the erect and the nodding-fructed 4-valved kinds, which Hooker and Thomson looked on as distinct species, as no more than varieties of *B. Napus*. Like Roxburgh, Hooker, and Thomson, they overlook the existence of nodding-fructed 2-valved *Sarson*.

The *Dictionary of Economic Products* reverses the treatment of Hooker and Thomson. The erect-fructed 2-valved *Sarson*, Roxburgh's *Sinapis glauca* (which these authors unite with Roxburgh's *S. dichotoma* and merge without qualification in *Brassica campestris* var. *Napus*) is kept apart by Watt as a distinct variety, var. *glauca*, of *B. campestris* proper. But the erect 4-valved* and the nodding 4-valved kinds he would place alongside of Roxburgh's *Sinapis dichotoma* and within *B. campestris*, var. *campestris* proper. Watt, however, like the other botanists referred to, does not allude to the existence of nodding 2-valved *Sarson*.

There is not, in the writer's mind, room for doubt: the *Sarson*, as a whole, is not the European "Rape;" though there is equally no doubt that, with the exception of the Chittagong "mustard" already described, it is the nearest to "Colza" of our Indian *Brassica*, and is perhaps, most suitably treated, from the botanical point of view, as a variety of *Brassica campestris* proper, the Colza plant. And obviously it does not affect the position of *Sarson* with reference to *Colza* whether we consider, with Linnæus and De Candolle, that Rape (*B. Napus*) is specifically distinct from Colza (*B. campestris*), or if we treat both Rape and Colza as only sub-species of one comprehensive species, that is to include not these alone, but the turnip (*B. Rape*) as well. But in naming our Indian "Colza" it is impossible to use

*This by a typographical error appears in the *Dictionary of Economic Products*, i. 622, as *Brassica quadrilobata* B. L. and T.

Indian Colza.

either of Duthie and Fuller's varietal names, *var. glauca*, *var. trilobularis* or *var. quadrifida*. Each of these applies to only one part of *Sarson*, and none of them includes the nodding-fruited 2-valved form of the plant.

It might be possible to use the name *B. campestris* *var. glauca*, on the authority of the *Kew Bulletin* for 1894, where, in a note on Guzerat Rape, the name is formally applied in such a manner as to cover the whole of the Indian "Sarson" crop. It is not, however, quite clear from that note whether the writer of the article means to include our Indian "Rape" also under the name. Indeed, the article does not make it clear that there are two very distinct oil-yielding Indian *Brassicæ*, apart from *Rai*, and does not lay stress on the fact that the one erroneously exported under the name "Rape" is not a Rape at all,* but is a plant much more nearly related to Colza. Under the circumstances it seems better to abandon the term "*glauca*" altogether, and to rename the Indian Colza plant *B. campestris* *var. Sarson*.

It is generally inadvisable to employ a barbarous name as a scientific term, but the word in this case has the obvious advantage of covering, in popular estimation, precisely the plant intended, whereas each one of the other terms used has varied in its incidence at the hands of different authors, without in a single instance according exactly with the actual facts. The detailed distribution of the four forms of *Sarson* cultivated in Bengal, as shown by samples sent to Kibpur, is given in the subjoined table, along with the names that accompanied each sample. The general distribution is shown on MAP II.

* M. DeCandolle points out (*Prod.*, ii, 211) that the same want of care in speaking of these plants was prevalent in Europe during the first quarter of the century. Then, however, it was the fashion to term the Rape plant "Colza," not to term the Colza plant "Rape."

Calculated at Super Experimental Farm, 1908-9.

Details of Surveys

Description.		Quantity.		Remarks.	
Sealed.	Unsealed.	Sealed.	Unsealed.	Sealed.	Unsealed.
	Beans		— Beans /		
	Chickpeas		— Beans /		
	Blackbeans		— Beans /		
	Blackish (Arma)		— Native Beans /		Blackish (Arma) 200 lbs.
	Peas		— Beans /		
	Greys (Blackish)		— Beans /		
	Greys (Peas)		— Peas /		
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 Indian Colza.

EXPLANATION OF PLATES V, VI, AND VII

PLATE V.

BRASSICA CAMPESTRIS LINDL. var. SARSON Prain.

(Sinapis glauca Roxb.)

Race with erect, 2-valved pods.

1. Plant before flowering, about $\frac{1}{2}$; from an example grown at the Sahpur Experimental Farm, raised from seed sent from Jhansi as Sakti Sarisha.
2. Portion of main stem with leaf and branch, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
3. Flowering branch, passing into fruit, $\frac{1}{2}$; from Roxburgh's drawing.

PLATE VI.

BRASSICA CAMPESTRIS LINDL. var. SARSON Prain.

(Sinapis trilocularis Roxb.)

Race with pendent, 4-valved pods.

1. Portion of stem, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
2. Flowering branch, $\frac{1}{2}$; from Roxburgh's original drawing.
3. Ripe capsule, $\frac{1}{2}$; from Roxburgh's drawing.
4. The same, cut transversely to show valves and dissepiments, $\frac{1}{2}$ from Roxburgh's drawing.

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PLATE VII

BRASSICA CAMPESTRIS LINN. var. SARSON Prain.

Capsules of the different races, from examples cultivated
at the Sibpur Experimental Farm.

1. Capsule of erect 2-valved, race "Natus," sub-race *glauca*, from Jessore.
2. Capsule of erect 4-valved; race "Natus," sub-race *quadrivalvis*, from Shahabad (Arrah).
3. Capsule of "Natus" Sarson, with only three valves and with the dissepiment to no side, from Burdwan.
4. Capsule of "Natus" Sarson, with four valves and two dissepiments, from Burdwan.
5. Capsule of "Natus" Sarson, with four valves and no dissepiment, from Shahabad (Arrah).
6. Capsule of "Natus" Sarson, with apparently four, but really only two valves, sent as "dauds" Sarson from Shahabad (Bhujpur).
7. Capsule of "Natus" Sarson, fully ripe, with seeds shed and valves fallen, from Shahabad (Arrah).
8. Capsule of "Natus" Sarson, with two seeds replaced by small abnormal capsules, from Darbhanga.
9. Capsule of "Natus" Sarson, with the axis ending in a small, complete, centrally-situated capsule within the normal capsule, from Burdwan.
10. Capsule of pendent 2-valved, race "Uti," sub-race *simplex*, from Jalpaiguri.
11. Capsule of pendent 4-valved, race "Uti," sub-race *trilocularis*, from Patna.
12. Capsule of "Uti" Sarson, with only three valves and with the dissepiment to one side, from Rangpur.
13. Capsule of "Uti" Sarson, fully ripe, with seeds shed and valves fallen, from Patna.

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II.—TORI, LUTNI OR MAGHI; INDIAN RAPE.

BRASSICA NAPUS Linn. *Sp. Pl.*, 666; var. *DICHOTOMA*.

B. praecox Walst. & Ku. *DC. Syst. Veg.*, ii. 593; *Prodr.*, i. 214.

B. campestris H. f. & T. *Journ. Linn. Soc.*, v. 169, in part.

B. campestris subsp. *Napus* H. f. & T. *Flor. Brit. Ind.*, i. 156, in part.

B. campestris subsp. *Napus* var. *dichotoma* Duthie & Fuller, *Field and Garden Crops*, ii. 29.

B. campestris subsp. *Napus* var. *Toria* Duthie & Fuller, *Field and Garden Crops*, ii. 29; Watt, *Dict.*, i. 525.

B. glauca Royle ex Atkins. in *Gaz. N.-W. Prov.*, x. 770, not *Sinapis glauca* Roxb.

B. campestris subsp. *campestris* var. *dichotoma* Watt, *Dict.*, i. 523, excluding the synonyms *B. quadrilobularis* and *Sinapis trilobularis*.

Sinapis dichotoma Roxb. *Hort. Beng.*, 48; *Flor. Ind.* iii. 117.

A cold-weather crop in the Indian plains and spring crop of the Himalayan range of rather short annual, much-branched herbs 1–4 feet high; the branches slender, spreading and forming a loose lax head 2–3 feet across. Root slender, tapering, 4 in. long. *Leaves* small, those at the base not exceeding 4 in. long by 2 in. wide, lyrate; all except the basal 2–3 auriculate decreasing upwards, those in the upper third of the stem 1–2 in. long, 5–7 in. across, triangular-lanceolate to a bluntish tip, with an entire margin and with large stem-clasping auricles at the base, pale-green glaucouscent, glabrous except for a few hairs on the nerves of the lower leaves beneath. *Stem* branching from the axils of 4th to the 7th leaf upwards, all branches about as long and strong as main stem and again laxly branching. *Flowers* in short corymbs, about 1.5 in. long when the lowest flower opens, subsequently elongating into a raceme 8 in. long with equal pedicels .6–.7 in. long, not appreciably lengthening in fruit, slender and without bracts or bractlets. *Sepals* spreading .2 in. long, .08 in. wide, green, becoming yellowish before falling. *Corolla* .6 in. across; petals with a pale-green narrow claw .12 in. long and a bright yellow regularly obovate blade .25 in. long, .2 in. across, veins faintly greenish beneath. *Pod* ascending 2-valved, including

B. 799–855.

Indian Rape.

the beak, 2-2.25 in. long; beak narrowly conical, .6 in. long; valves very convex, flexible, thinly leathery, with a strongish midrib, and with slender not prominent looped veins on each half-valve; valves at first much beaded opposite the seeds, less so when fully ripe. *Seeds* about 10 under each valve, bright brown, finely rugose with a greenish hilum; cotyledons yellow.

There is no possibility of confusing this plant either with *Sarson*, from which it differs very markedly in flowers, pods and seeds, as well as in habit and general facies, or with *Rai*, from which it differs in having stem-clasping leaves.

There are two forms of this mustard, very readily separated in extreme examples by the size of the plant and the rates at which they come to maturity; though, as will readily be believed, when two such indefinite characters have to be relied upon,—for there is absolutely no difference between the forms in leaf or flower, pod or seed—they are not always easily distinguished, because they pass into each other in both respects.

These forms may be defined thus:—

- (1) Tall, later *Tori*; 2-4 feet high; ripening, near Calcutta, in the last week of January.
- (2) Dwarf, earlier *Tori*; 1-1.5 feet high, ripening a week to ten days before the other.

The taller later kind is the plant which is termed *Brassica campestris* subsp. *Napus* var. *dichotoma*, by Duthie and Fuller. The dwarf earlier sort is the var. *Toria* of these authors and of Watt; it is also, so these writers say, the *sinapis glauca* of Royle as opposed to *Sinapis glauca* of Roxburgh. Roxburgh's *Sinapis dichotoma* is not, however, precisely the equivalent of Duthie and Fuller's var. *dichotoma*, for Roxburgh's species includes both forms.

Our Indian "Rape," for *Tori* is most certainly the representative in India of the European Rapes, just as *Sarson* is representative of the European Colzas, differs from the ordinary European plant mainly in having ascending pods. It agrees very well with specimens sent to Calcutta from various European herbaria as representative of the summer-rap of Europe—*Brassica praecox*, of which, as the *Dictionary of Economic Products* appears to suggest, it is probably only a form. At the same time *B. praecox* hardly seems to the writer more than a race, though no doubt a very distinct one, of *B. Napus* var. *oleifera*. For convenience, like it is here treated as a variety, and the term *dichotoma*, being older than the term *praecox*, is adopted in that sense.

B. 709—855.

grown at Sibpur.

W. Bengal.	District/Pargana	Locality	Botanical Pargana	Notes
N. Bengal.	Hoochly		Botanical Pargana Burdwan	Megh. Megh. or Indo. Kericha Kericha
	Madia		Midnapore	Madhava Kericha (? Madhava)
	Murshidabad	Kericha / Jono Kericha	Murshidabad	Shoffi Kericha
	Siliguri	Kericha	Purnea	Tori
	Jalpaiguri	Madhava Kericha	Jalpaiguri	Tori
	Rangpur (Nilphamari)	Madhava Kericha		Megh. Kericha
	(Kurigram)	Kericha		Megh. Kericha
	Dinajpur	Kericha	Dinajpur	Tori
	Malda	Kericha		Tori
			Rangpur	Kericha
E. Bengal.			Barisal	Kericha
			Mymensingh	Megh. Kericha
			Dacca	Megh. Kericha
			Faridpur	Megh. Kericha
			Barisal	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
CHITTAGONG.			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha
			Chittagong	Megh. Kericha

The Hemerbach sample named *Rai* was a mixture of *Tori* and *Kericha* and contained no *Rai*.
The Chittagong sample named *Rai* was a mixture of *Tori* and *Kericha* and contained no *Rai*.

Indian Rape.

The detailed distribution of the two forms of *Tori* cultivated in Bengal, as shown by samples sent to Sibpur, is given in the foregoing table, along with the names that accompanied each sample. The general distribution is indicated in MAP I, SECTION B.

The taller later *Tori* is quite unknown in EAST BENGAL or in ORISSA. It is very common in the other Divisions. The shorter earlier *Tori* is sent from every Division, and is the most universally grown mustard of the Lower Provinces.

In Northern Bengal, Dr. Buchanan-Hamilton informs us, this plant is sometimes deliberately sown very thickly; it then comes up leafy and weak, and the leaves are used as a potherb. The same practice prevails in Sikkim; when grown for its leaves, it is spoken of as a small kind of *Pach*, the name for *Brassica rugosa*; when sown for the sake of its seeds only, it is termed *Toori*, the form of the name *Tori* that prevails in North Bengal.

EXPLANATION OF PLATE VIII.

BRASSICA NAPUS Linn. *var. DICHOTOMA* Prain.

(*Sinapis dichotoma* Rarb.)

1. Plant before flowering, about $\frac{1}{2}$; from an example cultivated at the Sibpur Experimental Farm, raised from seed received from Houghly.
2. Portion of stem and primary branches with leaves, $\frac{1}{2}$; reduced from Rarburgh's original drawing.
3. Branch with flowers and fruits, $\frac{1}{2}$; from Rarburgh's original drawing.

K.—BHUTIA MOOLA, OR BHUTIA RAI.

BRASSICA NAPUS Linn. *Sp. Pl.* 686; *var. ESCULENTA* DC., *Prodr.*, i. 214.

Napus dulcis Blackw., *Herb.*, t. 410.

A cold-weather crop, in the Eastern Himalaya, of short annual, much-branching herbs, 1.5–3.5 feet high, the branches slender, and forming a rather lax head 1.5–2 feet
B. 799–855.

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- [illegible]

Aspidochelone *Line. Cent.*, 18, p. 113; *Ammon.*
Aspid., iv. 281; *DC. Prodr.*, 1. 215; *Fraasch. Mon.*
St. Nat. Oberb., xxiv. 200.

- St. Nat. Ochr.*, XLV. 200.
chinensis Linn. VAR.—*Vilmorin*, *Les Plantes pota-*
gères, 397.
campestris Forbes & Hemsl. Journ. Linn. Soc., xxiii.
 46 in part, not of Linn.
juncos Forbes & Hemsl. Journ. Linn. Soc., xxiii. 47 in
 part, not of H. f. & T.
clausena Linn. Sp. Pl. 667, VAR. *chinensis* Prain.
bracteata Linn., Syst. ed. xii. iii. App. 231 ;
 Hook. Hort. Beng., 48 ; Flor. Ind., iii. 120.
chui Vilmorin, l.c. ; Pak-wei Roeb., Flor. Ind. ;
 Yea-tsui Roeb., Hort. Beng.

As annual rains garden crop in the Indian States, of herbs with very short stocks till the plants begin to flower and with permanent radical leaves forming a loose umbel-like head resembling that of a leaf-bet, 8-10 in. in diameter; after warm 'shoots' into a tall stoutish stem 2-3 feet high, breaking into many spreading subequal branches, the whole forming a lax loose head 2-8 feet wide, the umbellish, terminal panicle 18 in. long. Leaves very large, 12-18 in. long, 8-10 in. wide, ovate, or oval-oblong, the margin entire, more or less undulate, turning abruptly at the base where they are slightly lobed or split to a thick white silky stalk 8-12 in. long, 1-1½ in. wide, continued into the leaf-blade as a broad white leafy main-nerve, neither ridged nor bristly, giving off fainter several smaller white leafy veins, the main rib also becoming laterally beyond the middle glaucous. Stem branching as soon as it shoots, from the axils of all leaves above the first leafy stock, above the axils like the leaf, but smaller, the branching the upper ones beyond the first stock of the stem and the branches being covered with a silky covering of the base. Flowers

Chinese Cabbage.

In dense, erect, upright, 1-2 ft. long, and 1 in. across when the flowers open. Leaves 1-2 ft. long, 1-2 in. wide, without bracts, and with a deepening yellowish green. Petals slightly spreading, 1 in. long, .66 in. wide, and numerous and greenish when they fall. Corolla .6 in. across, petals with a yellowish green, 1 in. long and a spreading bright yellow orbicular lobes, 1 in. across, veins darker orange above. Stamens 10-12, with recurved anther-tips, the two longer pairs with anther-tips incurved. Pods 2-valved, including stalk 2-2.5 in. long, .25 in. thick; beak rather thickly covered, 1 in. long; valves convex, rigidly leathery, rather finely serrated, distinctly beaded opposite the suture. Seeds 10-12 under each valve, spherical, dark-brown, somewhat rugose; hilum pale red-brown; cotyledons pale yellow.

This is certainly of Chinese origin. It does not appear to have ever been introduced by an overland route, and the first mention of its importation to India is that by Roxburgh in 1814. It never seems to have been a favourite vegetable, in spite of the fact that it is available in the rainy season when other vegetables are scarce, though in certain circles it is viewed with such favour that an order has recently been issued enjoining its cultivation in jail gardens. Prisoners are said to like it; it is, however, doubtful what value can be placed on a prisoner's opinion; any one save a prisoner, questioned regarding the merits of China cabbage, is likely to say he does not know of their existence.

Vilmorin calls this a "Cabbage," and the writer fully believes that it is in this plant yet another derivative of the stock from which Cabbage, Borecole, Broccoli, and Kohl-Rabi, etc., have sprung, as different in character from any of these as they are from each other. Forbes and Hemslay, however, think rather that it may be a derivative of the stock whence the Colza, Rape, and Turnip have sprung.

There is a little doubt that Roxburgh was right in identifying this plant with the *Sinapis brassicata* of Linnaeus and of Willd. If this be so, then *Sinapis brassicata* Lin. and Willd. and that by common consent we identify with *Brassica brassica* are one and the same thing. Forbes and Hemslay differ with Roxburgh, and identify *S. brassicata* Lin. with *S. juncea* H. & T. This is not probable, however, since Linnaeus says *S. brassicata* has a spreading, not a dense, clumping, while the one character of *S. juncea* is that the leaves are of a wedge-shaped form, while the leaves of *S. brassicata* are of a more or less wedge-shaped form.

Systematic Synopsis of the

B. bracteata Roth. is the same as the Chinese cabbage of gardeners, mentioned in the text. It is only in Roxburgh's description of the plant, however, that we find behind an excellent colored drawing, which shows that the plant not only bears the same Chinese name, but is actually the same as the plant figured 50 years later by Villars.

EXPLANATION OF PLATE I.

BRASSICA CHINESE Lind.

1. Plant before flowering, about $\frac{1}{4}$; from Filizade.
2. Radical leaf, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
3. Portion of flowering-stem, branch and leaves; $\frac{1}{2}$; reduced from Roxburgh's original drawing.
4. Stem-leaf, detached, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
5. Portion of flowering-stem, $\frac{1}{2}$; reduced from Roxburgh's original drawing.
6. Flower, $\frac{1}{2}$; from Roxburgh's drawing.
7. Capsule, $\frac{1}{2}$; from Roxburgh's drawing.
8. The same, cut transversely, $\frac{1}{2}$; from Roxburgh's drawing.

SECTION III.—SYSTEMATIC SYNOPSIS OF THE CABBAGES, COLZAS, RAPES AND RAIS.

SHOWING THE RELATIVE POSITION OF THE SEVERAL FORMS.

1.—*BRASSICA OLERACEA* Lind. Leaves glaucous or green, without hairs; only the flower-leaves touching the stem at their bases; the others very variable in shape, size, arrangement and coloration. The CABBAGE group.

VAR. 1. *sylvestris*. Stem slender, branched; leaves glaucous; radical leaves variegated, stem-leaves not collected in a head. "BLACKWORT" or "WILD CABBAGE" of Western Europe. More probably a plant that has become feral by reversion than the original stock whence cabbage has been evolved.

VAR. 2. *capitata*. Stem stout, not branched, simple or very rarely branched; leaves green; radical leaves variegated, stem-leaves not collected in a head. "RAPE," "COLZA," "RAIS" are among the names given to this cabbage under this variety.

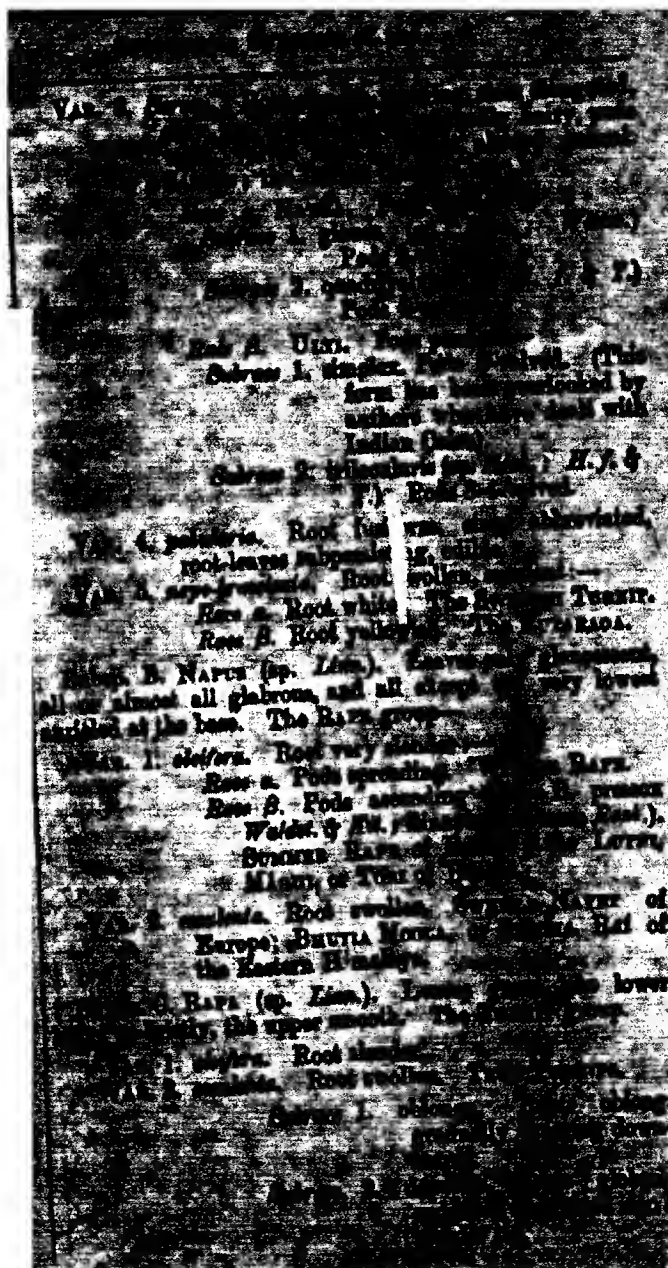
Cabbages, Cichus, Rapes and Rals

- VAR. 3. *botrytis*.** Stem short, not swollen, simple or very weakly branched; leaves glaucous, always pointed; radical leaves vanishing.
- VAR. 4. *botrytis*.** Leaves in lax heads at top of stoutish stem, without leaf-leaves.
- VAR. 5. *botrytis*.** Leaves in a spreading loose tuft at top of elongated stem, with numerous small compact heads in the axils of the present and of the fallen leaves.
- VAR. 6. *botrytis*.** Stem short, stout, not swollen, simple below stem-leaves; leaves glaucous, radical leaves vanishing; stem-leaves few, closely applied outside a rounded compact mass of white, fleshy branches. CAULIFLOWER and BROCCOLI.
- VAR. 7. *botrytis*.** Stem short, stout, not swollen, simple; leaves glaucous; radical leaves vanishing; stem-leaves many compacted in a dense head CABBAGE proper, whether globose, flat or conical, and whether red or white.
- VAR. 8. *botrytis*.** Stem short, stout, simple, swollen turnip-fashion beneath the origin of the loosely tufted glaucous stem-leaves; root leaves vanishing. SIAM CABBAGE, or KORE CABBAGE.
- VAR. 9. *botrytis* (sp. *Linn.*).** Stem none till time of flowering; leaves glaucous, radical leaves persisting to form a loose head like that of 'Leaf-Beet.' CHINA CABBAGE.

II.—*BRASSICA CAMPENTRIS* Linn. *ampl.* Leaves glaucous or green, usually at least the lowest leaves hairy; both stem and flower-leaves clasping the stem at their base. The RAPE and CHINA GROUP.

SUBSP. *AL. CAMPENTRIS* (sp. *Linn.*). Leaves very glaucous at least the lowest leaves with hairs beneath; radical leaves not stem-clasping. COLLA Group:—

- VAR. 1. *botrytis*.** Root fusiform, stem elongated, leaves mostly rather markedly hairy. WILD RAPE of Western Europe. More probably a plant of the local by reversion than a wild native.
- VAR. 2. *botrytis*.** Root fusiform, stem elongated, only lowest leaves markedly hairy, pale brown, others thin; plants naturally bluish. COLLA.



YAL 2. *...*

Subsp. 1. *...*

Subsp. 2. *...*

Subsp. 3. *...*

Subsp. 4. *...*

Subsp. 5. *...*

Subsp. 6. *...*

Subsp. 7. *...*

Subsp. 8. *...*

Subsp. 9. *...*

Subsp. 10. *...*

Subsp. 11. *...*

Subsp. 12. *...*

Subsp. 13. *...*

Subsp. 14. *...*

Subsp. 15. *...*

Subsp. 16. *...*

Subsp. 17. *...*

Subsp. 18. *...*

Subsp. 19. *...*

Challenges, Culture, Success and Style

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region of the infirmities; rather have

Var. chinensis (sp. = *Sinapis chinensis* *Link.*: *S.*
chinensis *Recht.*). Stem-leaves little-lobed;
flowers small, wild. This appears rather to
be a form of *R. hirsuta* feral by reversion.
Var. hirsuta (sp. = *Sinapis hirsuta* *Recht.*)

Var. *sinensis* (sp. = *Sinapis ramosa* Rostk.) Leaves much-lobed; plants tall, cultivated. The true Rut.

data. Tall, late, rough below,
smooth above.

2. *aspera*. Medium, early, tough with bristly hairs.

3. laevis. Medium, early, smooth,
dark-stemmed.

None of the leaves distinctly lyrate-
d, radical leaves persisting.

Var. *dentata* (sp. = *B. dentata* Wall. Mex.). Leaf margins very sharply dentate, midrib rather narrow, stem elongated. Perhaps this is a feral form of the next variety. More than a wild stock.

Var. 2. *S. rugosa* (Rost.). East.
Stems very sharply dentate, midrib very
prominent, stem none till time of flowering;
leaves not glaucous, leaves green.

VAB. *... (sp. Bart.).* Leaf margins slightly reddish broad, stem none till time of ... perlish stems distinctly, leaves ... LARU SAC.

Geographical Review

Country	Area (sq. mi.)	Population (1950)	Capital	Language	Religion	Government	Notes
Algeria	238,147	10,000,000	Algiers	Arabic	Islam	Monarchy	French protectorate since 1830.
Angola	481,011	3,000,000	Luanda	Portuguese	Catholic	Monarchy	Portuguese colony since 1482.
Argentina	2,780,171	15,000,000	Buenos Aires	Spanish	Catholic	Republic	Independence 1816.
Australia	2,980,000	7,000,000	Canberra	English	Anglican	Constitutional Monarchy	Independence 1901.
Austria	83,858	7,000,000	Vienna	German	Catholic	Monarchy	German Empire 1914-18.
Belgium	24,334	9,000,000	Brussels	Dutch, French, German	Catholic	Monarchy	German occupation 1914-18.
Brazil	3,280,567	50,000,000	Brasilia	Portuguese	Catholic	Republic	Independence 1500.
Canada	9,970,610	20,000,000	Ottawa	English, French	Anglican, Catholic	Constitutional Monarchy	Independence 1867.
Chile	296,708	4,000,000	Santiago	Spanish	Catholic	Republic	Independence 1818.
China	9,570,000	450,000,000	Peking	Mandarin	Buddhist, Confucian	Imperial Monarchy	German occupation 1915-18.
Colombia	300,000	5,000,000	Bogota	Spanish	Catholic	Republic	Independence 1810.
Czechoslovakia	78,867	6,000,000	Prague	Czech, Slovak	Catholic, Protestant	Monarchy	German occupation 1914-18.
Denmark	28,121	2,000,000	Copenhagen	Danish	Lutheran	Monarchy	German occupation 1940-45.
Egypt	705,000	15,000,000	Cairo	Arabic	Islam	Monarchy	British occupation 1882-1914.
France	406,957	40,000,000	Paris	French	Catholic	Republic	German occupation 1940-44.
Germany	357,021	60,000,000	Berlin	German	Catholic, Protestant	Monarchy	German Empire 1871-1918.
Greece	113,512	5,000,000	Athens	Greek	Orthodox	Monarchy	German occupation 1941-44.
India	1,900,000	350,000,000	New Delhi	Hindi, English	Hindu, Muslim, etc.	Monarchy	British Empire 1858-1947.
Italy	298,330	45,000,000	Rome	Italian	Catholic	Monarchy	German occupation 1940-45.
Japan	377,835	70,000,000	Tokyo	Japanese	Buddhist, Shinto	Monarchy	Imperial Japan 1868-1945.
Poland	125,109	35,000,000	Warsaw	Polish	Catholic	Monarchy	German occupation 1939-45.
Romania	201,314	10,000,000	Bucharest	Rumanian	Orthodox	Monarchy	German occupation 1940-44.
Soviet Union	22,402,200	170,000,000	Moscow	Russian	Orthodox	Monarchy	Imperial Russia 1855-1917.
Spain	505,000	25,000,000	Madrid	Spanish	Catholic	Monarchy	German occupation 1936-39.
Sweden	449,964	2,500,000	Stockholm	Swedish	Lutheran	Monarchy	German occupation 1940-45.
Switzerland	41,285	2,500,000	Bern	German, French, Italian	Catholic, Protestant	Monarchy	German occupation 1914-18.
Turkey	780,456	15,000,000	Ankara	Turkish	Muslim	Monarchy	German occupation 1914-18.
U.S.S.R.	22,402,200	170,000,000	Moscow	Russian	Orthodox	Monarchy	Imperial Russia 1855-1917.
U.S.A.	3,796,971	130,000,000	Washington	English	Protestant, Catholic	Republic	Independence 1776.
U.K.	244,818	50,000,000	London	English	Anglican	Monarchy	Imperial Britain 1801-1922.
Yugoslavia	101,847	10,000,000	Belgrade	Serbian, Croatian	Orthodox, Catholic	Monarchy	German occupation 1941-44.

of the Bengal Mustards.

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Geographical Review

Province	Division	District	Subdivision	Mount.	Range and	Remarks
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B. 799-855.

Names of the Mustards.

SECTION V.—RELATION OF NAMES BY WHICH *Rai*, *Sarson*, AND *Tori* ARE KNOWN IN BENGAL TO DISTRICTS IN WHICH EACH IS GROWN.

1. As has been already explained, *Rai* is grown in all the divisions of the Lower Provinces except Chota Nagpur, where it is practically unknown. A single sample, it is true, came from Singhbhum, with the name *Rai*, but the plants raised from the seed sent were in equal parts *Sarson* and an early *Rai*, and a second sample sent as *Rai* from Hazaribagh, proved to be *Tori* mixed with *Sarson*.

The two earlier subraces, common in the eastern districts (Tirhut and extending into Jalpaiguri, are cultivated throughout South Bihar and in all the drier districts of West Bengal, crossing the Hooghly into Nadia and the 24 Parganas. They reoccur again in Tippera and Chittagong, but are quite unknown in the intervening area (Mar I, Section A; area enclosed by red line).

The taller later subrace, quite absent from Chittagong and Tippera, and altogether wanting in Chota Nagpur, is present in every other Division, though it has not been reported on Northern and Central Tirhut (Champaran, Darbhanga, and North Bhagalpur)—(Mar I, Section A; area within blue line).

The usual name for *Rai* in the Lower Provinces is *Rai*, occasionally given as *Laki* (Saran) or *Li* (Mymensingh). Of 10 samples that proved to be really *Rai*, twenty-six bore this name. In dealing with the variants, it will perhaps be most convenient if the divisions are taken in detail.

TIRHUT.—In West Tirhut (Saran and Muzaffarpur) the name is *Rai* or *Laki*; from Darbhanga it is sent, rather oddly, *Tori*, while from North Bhagalpur (Supal) and from Purnea it is sent as *Rai* or *Rai* or simply *Rai*. For the Supal sample this name (if it means "small *Rai*") is not altogether inapplicable, as the kind sent was the short, smooth early race, but it was not at all applicable to the Purnea sample, which was the finest, tall, late subrace. The name also comes from Monghyr. There, however, it is applied to a usage that one can easily understand if the plant is what is thought of.

WEST BENGAL.—From Shahabad (Bhujpur) the three recent subraces are sent and are carefully distinguished: tall is *Rai*, rough early is *Laki*, *Tori*, smooth early is *Langri*. At Arrah the tall late is not sent; the "rough early" and "smooth early" are, however, both reported—the former as *Rai*, the latter as *Laki* *Rai*. The name *Laki* (dwarf)

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Relation of different names

is not particularly applicable to any *Rai*, though it is used also in Bankura; there, however, for the 'rough early,' not the 'smooth early': as we shall see, this name is generally employed to indicate *Tori*. From Patna 'tall late' comes under its proper name *Rai*, and the same subrace is sent from Monghyr, but under the names *Gota* or *Tori*. If *Gota* means "entire," it is not easy to see how it is applicable in this connection. The same name is used with a sample of 'rough early *Rai*' from the Sonthal Parganas.

Orissa.—The name sent with a sample from Angul of 'tall late' *Rai* is *Chota Sarisha*. The *Ror Sarisha* sent from the same place is the dwarf *Tori*; the names therefore apply to the seeds, not to the plants. The plants of this *Rai* were 5 feet high, and were twice the height of those of the *Tori*, the seeds on the other hand were, weight for weight, *Tori*, 34 = *Rai*, 60 or thereabouts.*

No explanation of this discrepant usage of *Ror* and *Chota*, or of the similarly discrepant application of the names *Rai* and *Tori*, has yet been suggested. It is just possible that where the diminutive term is applied to the *plant*, the expression of oil from the seeds is a local industry that absorbs the whole of the seeds there grown; the seeds being a purely domestic article receive an attention subordinate to that bestowed on the plant. In districts where the seeds of mustard are grown for export, these, as the commercial article, receive an attention to which that given to the plant, as such, is in a manner subordinate. It need not necessarily follow of course that *present* conditions should in every case bear out this suggestion.

Coming now to Bengal Proper, we find that the same state of confusion prevails.

WEST BENGAL.—From the Sonthal Parganas all three kinds are sent and, as in Shahabad, each is distinguished by a special name. As at Bhujpur, so here "tall late" is known as *Rai*, 'rough early' is sent as *gota* (the name used for "tall late" in Monghyr), and 'smooth early' is known as '*Man Sarisha*,' perhaps meaning "our own special mustard." Bankura sends only 'rough early,' and sends it as *Lutna*, which is really the Chota Nagpur name for *Tori*; Burdwan sends two samples of the same 'rough early' subrace, one of them as *Rai* which is an accurate enough usage, the other as *My* or *Maghi*; this last, we shall presently find, is the East Bengal name for *Tori*. Midnapore does not send the 'tall late' subrace at all, but sends both the others, distinguishing the

* The actual numbers in a batch of seed of the original samples were *Tori* (*Ror Sarisha*) 3,360, *Rai* (*Chota Sarisha*) 5,904.

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ough 'early' as *Rai Sarala* and the 'smooth early' as *ra Sarala*.

Highly sends two samples of 'tall late' *Rai*, one as *Ki* is *ra*, a term used in contrast to *Sarala Sarala*, generally employed in Bengal for what is called Sarson, the other *Rai*, interesting as being the same reported long ago

at Agra. From the 24-Parganas comes a sample 'tough early,' under the name *Ard Sarala*, a term in used with reference to the colour of the seeds; the occurs also in North Bengal, but it is there restricted

Tori. From Jessore come two samples of 'tall late' *Rai* names that repeat exactly the Burdwan usage as 'tough early'; one is properly termed *Rai*, for the other the name *Mai* is (restricted in East

gal to *Tori*) is used. Naha sends 'smooth early' as *Rai* and Murshidabad sends 'tough early' as *Tori Sarala*.

term *Tori* is in North Bengal restricted to *Sar* in

North Bengal.—Purnea sends both 'tall late' and 'tough early'; the names are most unaccountable, for the 'early' and shorter subrace is termed *Rai*, the 'later,' very tall kind, is termed *Rachi*. The sample named *Rhi* is from the Sadar subdivision; that named *Rachi* is from Arrana. All the other districts send samples; in every case these belong to the 'tall late' subrace and in every instance they are correctly named *Rai*.

East Bengal.—The samples from all the districts, except Tippera, were 'tall late' *Rai*, from Dinaj, Faridpur, Jessore (Sadar), and Bakergunge (Haldiganj) were sent as *Rai Sarala*. One from Mymensingh (Sadar) came as *Li Sarala*, and one from Bakergunge (Sadar) as *Kula Sarala*, thus repeating the usage in Agra. A sample from Mymensingh (Nadra) was sent as *M ghli Sarala*, it differed in no respect from a sample sent as *Rai*. The same name occurred in Tippera, but there it was applied to a sample of 'tough early.' Curiously enough, the only other sample from Tippera was this same 'tough early' subrace, and it was called *Rai Sarala*.

Chittagong.—As from Tippera, only 'early' *Rhi* was saved from Chittagong under the name "Small *Rai*." The sample was a mixture of both the 'tough' and the 'smooth early' subraces. The name had reference to the seeds apparently, for the only other sample sent from Chittagong as "Mustard" was also a mixture; it consisted of a plant unlike any other Bengal mustard, and most

resembling European "Colza," with ordinary *Tori* in about

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equal proportions. The seeds of the two are very similar and are larger than the seeds of *Rai*.

2. *Sarson*, in one form or another, seems to be grown everywhere throughout the Lower Provinces except in Chittagong. It is there replaced by the plant that it seems impossible to separate from true "*Colza*."

Sarson with pendent pods is, however, very little known or grown. It is, in the two-valved state, restricted to Purnea and Jalpaiguri in North Bengal, crossing the Ganges into the Sonthal Parganas (Map II, Section B; area within blue line). In its 4-valved state this race occupies the same area as the 2-valved, but extends eastward through the whole of Rangpur and northward into British Sikkim (Kurseong subdivision), while it occurs also in the extreme west of our area, in the districts of Shahabad and Palamau (Map II, Section B; areas within red lines). In the intermediate area, Muzaffarpur, etc., it only occurs as a mixed crop along with erect 4-valved *Sarson*. It has not been sent at all from western Tirhut (Saran and Champaran).

Sarson with erect pods is the race usually met with. In its two-valved form (Roxburgh's *Sinapis glauca*) it extends throughout the whole of Chota Nagpur, Orissa, West Bengal, and East Bengal, including Tippera, but excludes Mymensingh (Map II, Section A; area within blue line). The only district of South Bihar from which it has been sent is Shahabad. In its 4-valved form *Sarson* occurs in western Tirhut and south-western Bihar; while absent from the eastern half of Tirhut and from the south-east of Bihar it recurs in North Bengal, where it extends from Dinajpur and Rangpur across the Brahmaputra into Mymensingh (Map II, Section A; area within red line). The two subraces between them thus occupy almost the whole of the Lower Provinces without, however, their areas overlapping, except in the district of Shahabad in South-West Bihar, where the 2-valved Bengal and Chota Nagpur plant crosses into Bihar; also in a narrow strip along the west of Bengal, since one finds that the samples from Monghyr, Bankura, and Burdwan down even to Midnapore yield mixed crops of erect 4-valved and erect 2-valved. The gap between the two areas occupied by 4-valved erect-fruited *Sarson* is to a large extent filled by the pendent-fruited 4-valved subrace.

Unlike *Rai*, which is cultivated under the same name throughout our area, *Sarson* is known by different names in different Divisions. The name *Sin* is used throughout Tirhut, South Bihar, Chota Nagpur, and in a modified

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in North Bengal, but it is quite unknown in Orissa, in any part of Western or Eastern Bengal. The divisions may again most conveniently be taken in detail.

TINNETT.—Only the 4-valved erect-fruited subrace is sent, always as *Sarcocolla*.

FOUR BROTHERS.—In Shahabad the 4-valved erect and the 4-valved nodding subraces are *Nether Sarcocolla* and *Upper Sarcocolla* respectively. In Patna the 4-valved erect is *Sarcocolla* and in Gaya two samples of the same subrace were sent—one in Manghiawan sub-division was named *Sarcocolla*, one in Gaya sub-division was named *Fora*. A fine sample of samples, it from Shahabad (Bhujpur), of 2-valved erect-fruited erect leaves especially noticed. One of these samples, with very thick pods, to outward appearance like those of the 4-valved erect, but with the pods really only 2-valved, was termed *Lower Sarcocolla*. But other three forms, viz., one with large black seeds, one with medium yellow seeds, one with large white seeds, were termed *Peoria Fori*, *Peoria Fori*, *Lanka* respectively. Here, again, we have the word *Fori*, sent to one of the Gaya samples, used freely as a synonym for *Sarcocolla* and its use with the yellow-seeded forms—*Fori* for large, *Fori* for the smallest-seeded. It may indicate the source of the name *Fori*, which is so commonly applied to the Indian pea. But the usage is not always precise, for even in the sent ones, though there was sent from Bhujpur a *Lanka* corresponding to the *Lanka Fori*, it turned out, as has already explained, to be 'rough', early *Fori*, and not either an Indian Rape or an Indian Canna. A sample from Manghiawan, sent as *Sarcocolla*, though mostly 2-valved, had 4-valved mixed with it.

FOUR NAGPURA.—From western Chota Nagpur—Palamau, Birahat, Lohardaga—the clean samples were all termed *Fori*. A sample sent from Hazaribagh as *Fori* proved to be a mixture in about equal parts of *Fori* and *Sarcocolla*. From Manikpur a sample of *Sarcocolla* was sent, but without any *Fori*. From Singhbhum one, sent as "*Fori*," was a mixture *Fori* and *Sarcocolla*.

FOUR KANSA.—The sample of *Sarcocolla* sent was named *Gangra Sarcocolla*. Perhaps the name is intended to compare the seed of the seed with the Ganges' stream.

EAST BENGAL.—From the Sonthal Parganas were sent two samples of erect-fruited 2-valved *Sarcocolla*—one as *Thara*, the other simply as *Sarcocolla*, while a pendent-fruited sample came from Rajmahal only, as *Peoria* (or "eastern") *Sarcocolla*. In Bankura came two samples, both mixed—erect 2-valved erect 4-valved. One was named *Fori* or *Pyala Sarcocolla*.

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the other *Rai* or *Jhanti Sariaka*. As the two were identical it is possible that the second name was sent by mistake. The other samples from West Bengal were sent as *Sheti* or *Sheti Sariaka*, with the exception of two from Midnapore, which came as *Sheti Rai* and *Sadha Bheta Rai* respectively. These are very interesting examples as being the only ones in which *Sarson* is deliberately termed a *Rai*, for the two occasions on which the name *Rai* is associated with samples containing *Sarson* that came from Ohota Nagpur must obviously be discounted as the result of ignorance, *Rai* being practically unknown in Ohota Nagpur; and the one occasion in which *Sarson* was sent as *Rai* from Bankura was clearly a mistake. The interest is heightened because this is the vernacular term reported for *Sarson* by Roxburgh, both in the *Hortus Bengalensis* and in the *Flore Indica*. According to Roxburgh the name *Sheti Sariaka* was applied to *Brass carota* at the beginning of the century. This name is certainly more usually applied now to *Sarson*. But it need not be concluded that Roxburgh was mistaken; he very rarely was, and it is interesting to find that the usage reported by him still prevails in Midnapore. The sample termed *Seti Rai* was 2-valved; the *Sadha Bheta Rai* was mixed 2-valved and 4-valved.

NORTH BENGAL.—The name *Sarson* accompanied samples of pendent 4-valved *Sarson* from Purnea and Kurmoo; the same subspecies from Rangpur was sent as *Shes Sariaka*; the same name from Jalpaiguri was, however, sent with *Tori*. Pendent 2-valved came from Purnea as *Tora*, from Jalpaiguri as *Sheti Sariaka*. From Dinajpur the name *Toro Sariaka* accompanied erect 4-valved; erect 4-valved from Rangpur was sent as *Dhopa*. From Rajshahi the sample sent as *Seti Sariaka* was mostly erect 4-valved, though there was some 2-valved erect mixed with it.

EAST BENGAL.—Erect 4-valved, which extends into Mymensingh, was sent from Jamalpur subdivision as *Dhupi Sariaka*, and from Netrakona under the usual Bengal name, *Sweeti Sariaka*. From all the other districts only erect 2-valved *Sarson* has been sent; from Dacca under the West Bengal name, *Sweet Sariaka*, but from Moulvibazar as *Makhan Dhono Sariaka*, and from Noakhali and Tippera as *Dhono Sariaka*.

3. *Tori* is grown in every one of the Bengal Divisions. Of the two subspecies, the taller and later seems to be unknown in East Bengal and Chittagong, while the shorter and earlier is not sent from Western Tibet. Both are sent from every other division, and indeed from most of the districts of the Lower Provinces. Strangely neither sort has been sent from Chakabed in South Bihar, or Ghazipur in Tibet.

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is to say, from the districts west of the Son and Gandak.

The name *Tori*, which is here used to designate the "Indian Rape," is, like the name for *Sesam*, quite arbitrarily selected as the one by which it shall be known. The reason for adopting it is that it is a familiar word in Hindi-speaking districts. It is, however, in our area used only in Tirhut and South Bihar, and, altered to *Tseri*, occurs in the districts of North Bengal nearest to the Terai. In Chota Nagpur this is the mustard known as *Lafni* (dwarf); in Orissa and Western Bengal it is the plant known especially as *Serika*; in East Bengal it is the plant known as *Meghi* or *Meghi Serika*, owing to its ripening in *Megh* (January-February). There are, however, especially in West Bengal a number of variants, which will be most easily dealt with if the divisions are considered in detail.

TIRHUT.—From Champaran the taller sort was sent without a name; from Munaffarpur and Darbhanga it came as *Tori*. The *Tori* of North Bhagalpur and Purnea was, on the other hand, the shorter earlier variety.

SOUTH BIHAR.—From Monghyr the West Tirhut form was sent, but the name given was *Raichi*; from Gaya the shorter earlier form characteristic of North Bhagalpur and Purnea was sent as *Tori*. It is to be noted therefore that while both forms receive in Tirhut the name *Tori*, this name in South Bihar is restricted to the more dwarf form, the other receiving a name that in Eastern Tirhut is applied to a form of *Rai*. A consultation of Grierson's admirable work, *Bihar Peasant Life*, chap. xix, p. 246, will show that this accurate scholar gives the name *Tori* as an equivalent for *Rai*. As has been already shown, the mistake is not that of the author, but of the people themselves; the sample of *Rai* received from Darbhanga was sent as *Tori*, and when Roxburgh, 90 years ago, had a figure of this mustard made in the Calcutta Herbarium, he experienced the very difficulty that has been met with by Grierson and by the writer; in the figure of his *Sinapis dichotoma*, Roxburgh has himself written the following note:—

"*Shanaki* or *Shoraki* about Calcutta; *Toree* about Purnea; certain because *ramcees* and this came up equally plenty on the same parcel of seed sent by Dr. Fleming under a name *Toree*. Now, whether is this or *ramcees* '*Toree*'?"

CHOTA NAGPUR.—In most of the districts of this Division, *Tori* is known as *Lafni* (dwarf). It is applied to samples of the taller form from Lohardaga, Palamu, and Singhbhum. An example obtained from Hazaribagh was the shorter earlier

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sort. This earlier sort came also from Singhbhum, and is evidently there distinguished as *Chota Sariska*. Here the adjective applies to the plant, not, as was the case when the same name came from Orissa, to the seeds. The name *Lutni* passes beyond Chota Nagpur eastward to the adjacent districts of Birbhum and the Sonthal Parganas, in both cases being used for the proper plant; it also extends to Bankura, but is there misapplied to *Rdi*.

ORISSA.—This is the commonest of the Orissa mustards; it was sent as *Sariska*—the usual term in Bengal proper; as *Kala Sariska*—a name used in Bengal for *Rdi*; and as *Bar Sariska*—a name used, because of its larger seeds, to distinguish it from *Rdi*, which in Orissa is termed *Chota Sariska*.

WEST BENGAL.—In the Sonthal Parganas both kinds are known: the taller is sent under the Chota Nagpur name, *Lutni*; the shorter under the East Bengal name, *Mdghi*. In Birbhum only the short kind is known, and it gets the two names, *Lutni* and *Mdghi*, as alternatives. The name *Lutni*, it will be recollected, occurs also in Bankura, but is there misapplied to *Rdi*. From Burdwan, but from nowhere else, the name *Sonchi*, interesting as being one of the names used by Roxburgh in the *Flora Indica*, accompanied a sample of the smaller variety. The simple name *Sariska*, that given by Roxburgh in the *Hortus Bengalensis* and used as an alternative (*Shorski*) in the *Flora Indica*, was sent with the taller sort both from Nadia and from Murshidabad. From Murshidabad another sample of the taller sort was sent as *Jema* (edible) *Sariska*; one of the shorter sort from the same place was sent as *Bhati Sariska*.

A Midnapore sample of the shorter form is termed *Sadharan Sariska*; possibly Roxburgh's third alternative name, *Sadha Reyes*, which is altogether meaningless as applied to *Tori* (*Sinapis dichotoma*),—since *Tori* is not a *Rdi*, and is not white (*sadha*),—may be hidden in the word *Sadharan*. A sample from the 24-Parganas had no name.

NORTH BENGAL.—The Purnea name *Tori* appears as *Teori* from Dinajpur and Siliguri in connection with the same short subrace of *Tori*, the taller form being sent from Dinajpur with the ordinary Bengali name *Sariska*, and from Siliguri with the name *Kandis*, which is used again with one sample from Rangpur (Kurigham subdivision). Another Rangpur sample of the taller sort (Nilphamari subdivision) is sent with the East Bengal name *Mdghi Sariska*. The same name is given with a sample of the shorter sort from Jalpaiguri; the taller sort, as sent from Jalpaiguri, receives the name *Sadha Sariska*—a name applied in the adjacent

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district of Rangpur to one of the forms of *Sesam.* From Malda the taller sort of *Tori* was sent under the ordinary Bengal name *Sariata*. Under the same name were sent samples of the shorter sort from Rajshahi and Pabna respectively.

EAST BENGAL.—All the samples from East Bengal were of the shorter sort of *Tori*, and all were termed *Mughl Sariata*.

CHITTAGONG.—Here too the only kind of *Tori* known is the shorter-stemmed subrace. But it was sent in one case mixed with the plant that seems to be European "*Colza*," and that replaces, though it certainly is not a form of, *Sesam.* The name given to this mixed sample was simply "mustard," no vernacular term being sent. There were other two samples from Chittagong, both of them unmixed: one was sent with the Bengali name *Sariata*; the other was sent as "reddish rape."

SECTION VI.—DISCURSIVE CATALOGUE OF THE NAMES APPLIED TO THE MUSTARDS OF BENGAL.

In the preceding chapters it has been considered better to use the names given with the samples as they were received at the Sibpur farm. But Dr. Hornole, who has had the great kindness to look over the original list, has pointed out that the transliterations sent from the various districts are not always correct. Moreover, the vernacular characters have not in every case been sent; and in one or two instances there seems to be something wrong with the actual vernacular spelling. In the present list, which for convenience of reference has been made purely alphabetic, an attempt is made to show the proper spelling. The writer would here like to express his very warm thanks to Dr. Hornole for his connection with this catalogue which he has perused and enriched with many notes.

Bādhī sarīā (बाधी सरिया). This term comes only once, in Murshidabad (Sadar). It is applied to *Tori*, and the significance of the term is rather obscure. If *bādhī* here means, as it generally does in Bihar, the "bellow," the name would apply, with some force, to either of the 4-valved races, and especially to the erect-fruited subrace (PLATE VII, figs. 2-6), but as applied to *Tori*, it does not convey any particular meaning. One might have supposed that there was some mistake about the incidence of the name, had any 4-valved *Sesam* been grown in Murshidabad; however, Murshidabad is quite outside the 4-valved area (MAP II, both sections, red areas). Can the name be in use anywhere

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within the 4-valved area? This is just possible, and it is also possible that the people of Murrshidabad may think they have the "bellows-fruited" *Sorā*, but are mistaken. Instances of similar mistakes will be indicated further on.

Perhaps a confirmation of this explanation of the meaning is to be found in the use of the same word with reference to *Sola*. In comparing true *Sola* (*Aschmannia saponaria*) with the woody *Sola*, *Kāth-Sola* (*Sesbania portulacastrum*) our country-people often, instead of saying *Sola* and *Kāth-Sola*, compare them as *Bāṭā-Sola* and *Kāth-Sola*.^{*} The idea, however, underlying the use of the word here is not the shape, but the softness and compressibility of the *Sola* stem, as well as the fact that when squeezed tight the air inside it, if it be compressed under water, escapes in bubbles. It does not, however, seem clear that the word 'bāṭā' is ever used for the "bellows", as such, in Bengal proper.

Bāṭā rai (বাতাঁর); see *Sadha bāṭā rai*.

Bāṭri (বাতাঁ); *Bāmri* of previous chapter. A term received only from Hooghly (Jahanabad) and applied to *Tōri*. The name is evidently used in contradistinction to *Jāmri*, the local name for *Rāi*. It is said to mean "(mustard) preferring a light soil." The words do not appear to be indigenous Bengali terms. The present one is applied to a kind of *amhar* wheat in South-West Bihar (Grierson, *Bihar Present Life*, p. 213, § 956); it is also used of *kerake* bullocks (Grierson *loc. cit.*, p. 289, § 1107).

Sar Soriā (সর সরিষা). This term is only once used; it comes from Angul in Orissa. It is applied to *Tōri*, which, as a plant, is really much the smallest of the three Bengal mustards. The name *Chāṭā Soriā*, from the same district, is applied to *Rāi*, which is the tallest of the three, but which has much smaller seeds, so that one must conclude that the relativity expressed refers to the seeds, not to the plants. Even then the explanation is not altogether satisfactory, since *Sorā* is sent from the same district, and *Sorā* seeds are rather larger than *Tōri* seeds. In the present instance only 3,180 *Sorā* seeds went to one *tolā*, as against 3,300 *Tōri* seeds.

* Kohn et Dr. HERRMANN.—The "bellows" theory is very plausible. My objection as a philologist is that bellows is spelled either *bāṭā* (বাতাঁ) with dental *tā* (as Grierson has it, section 414) or *bāṭā* (বাতাঁ) with cerebral *ṭā* (as Lane's Dictionary has it). In any case, the *tā* is aspirated, while your word is spelled *bāṭā* (বাতাঁ) without aspiration.

The objection is not insuperable. Occasional instances of *t* for *ṭ* are found. The figures certainly suggest bellows.

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The *Rai* sample, however, had 5,904 seeds to a *sele*, and was thus manifestly smaller-seeded. Both *Rai* and *Tori* are brown-seeded, the *Sarai* being white-seeded. Perhaps, therefore, the cultivators only compare the two first, mentally as well as verbally.

Chala Sarai (চলা সরিষা).—This term is used twice; in one case, from Orissa (Angul) it is applied to *Rai*, and is therefore clearly employed with reference to the small seeds; in the other case from Singhbhum (Chyabasa) to *Tori*, and is therefore clearly employed with reference to the size of the plant.

Chala Sarai (চলা সরিষা); used once, from Bangor, with a sample of erect 4-valved *Sarai*. The meaning of the term is not clear; it is said to be the same as *chala*, and means, therefore, light-coloured (white or yellow). The sample consisted of four-fifths white, one-fifth brown-seeded.

Chala Sari (চলা সরি); apparently the same word as the preceding; used once, from Burdwan, with a sample of erect 4-valved *Sarai*. If, as has been suggested, both the words are the same in meaning, the term may be intended to imply 'very white' or 'pure white.' In this instance the seeds were white.

Dhara Sarai (ধারা সরিষা); used twice, from the adjacent tracts of Tippera and Noakhali. The Tippera sample was an one of erect 2-valved white-seeded *Sarai*; the Noakhali one was the same, mixed with about 10 per cent. of

The name was in both cases transliterated *Dhara*; the meaning possibly is *dhan* (= *dhanya*) 'good, auspicious,' or word may be the *Skr.* *dhanya*, = any kind of corn grain.

Chapi Sarai (চাপি সরিষা); once used, with a sample from Jessingh (Jamalpur), which was a mixture in equal parts white and of brown-seeded erect 4-valved *Sarai*. The name may be intended to represent the idea conveyed by *chapi* (= incense), and indicate that the odour of the seeds is of a superior quality.

Dhara Rai.—This name was sent from Shahabad (Arrah) but a vernacular spelling. The mustard so named was a 'rough early' subrace of *Rai*. *Dhara* is the name given to the 'fresh land thrown up by the shifting of course of a river' (Grierson, *Bihar Peasant Life*, p. 102, 5); the adjective is applied to crops grown on such land.

Dhara (ধারা). This name is twice sent: once from Ghyr, with the alternative name *Tori*, and again from the Bahadurganj. It is apparently a very local name; its

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meaning is not clear. In *Bihar Peasant Life*, p. 246, § 1055, Grierson mentions the name as applied to *Sarā* in the form *Gā* (South Bhagalpur), and also (North-East Tirhut) in the form *Gā*. Oddly in neither case was the sample *Sarā* as given by Grierson; it was not even *Tōri*, as suggested by the officer who sent the Monghyr sample. Both were *Rāi*, the Monghyr sample being the "tall, late;" the Bonthal Parganas one the "rough early" subrace. One native informant says that *Gā* means "entire, or the reverse of broken"; if so, the term is not particularly apposite. Grierson, however, in another passage gives *gā* as a term used in the Gaya district in a general collective sense for "seed." If this be the meaning, the usage here is perhaps parallel to the use of the term *Dhā* in Tippera and Noskhali.

Gangā Tariyā Sarā (गंगा तारिया सरा).—This expression is sent with a sample from Orissa (Angul). The name may have reference to the colour of the seeds, comparing them to the colour of the Ganges. But the sample was mixed with white-seeded *Sarā* and *Tōri*; so that if this be the explanation, it is not clear to which of the seeds the term applies. *Tariyā* is apparently a local variant of *Tōrā*, *Tōri* (q. v.).

Junda Sarā.—A name sent from Shahabad (Aizah) without the vernacular character. The form was a *Sarā* with erect pods, thick and swollen, as in the 3-valved kinds, but with the pods nevertheless normally 2-valved and with a complete partition dividing the fruit into two chambers. The meaning of the term has not been ascertained.

Jemā Sarā (जमा सरा); sent as *Jemā*. Only one received, from Murshidabad (Kandi). The mustard was pure *Tōri*. Some of the writer's native informants suggest that *Jemā* means "edible;" if so, the word does not appear to be a Bengali one.*

Jāṭi Sarā; *Rāi* or (जाति राई).—There is some confusion about this sample, which came from Bankura (Vishnupur) along with another termed *Sāi* or *Piyāṭa Sarā*; and a third termed *Lafai*. The *Sāi* was, as a matter of fact, the same as the *Sāi* of Bengal generally, common *Sarā*; but so was the present sample. The sample termed *Lafai* (which is the Chota Nagpur term for *Tōri*) was in reality a clean sample of rough early *Rāi* and not *Tōri* at all; while the sample termed *Rāi* had no *Rāi* in it. Still it is not impossible that the term sent with the present sam-

* Note by Dr. HANSEN.—Quite possible. In Sanskrit (जम्) means "eating," "food." Hence Hindi *jāmā* to eat, *jāmā* etc. I have found *jāmā* applied to a kind of "spiced fritters."

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really applied to *Rai*, not only because that name itself need, but because the alternative name is most applicable *Rai*. So far as can be learned, *Jai* means "branched," with the further implication that the branches lie close to each other and to the main stem, which is exactly the case with *Rai*.*

Jhuni (জুনি).—A term used for *Rai* in the immediate neighbourhood of Hooghly, Howrah, and Calcutta, but of which no one knows the meaning. It possesses the interest of being the name applied by Roxburgh to the same plant, which is his *Sinapis ramosa*. It is possible that it had originally the meaning that *Jai* bears, and that Roxburgh's use of "ramosa" was suggested by this fact.†

Kajal (কাজল); twice used: once from Rangpur and once from Siliguri. Though the name is the same as the following, the usage is different, for both samples were *Tori*.

North Bengal therefore *Kajal* seems to be used as *ai* is used in Orissa; not altogether, however, for two samples of *Tori* were sent from Siliguri, one of them (the later kind) carefully marked '*Kajal* or "purple" *trica*', the other (the shorter earlier sort) marked '*Tori* "black" *Sarica*'.

Kajal Sarica (কাজল সারিকা); once used, with a sample from the 24 Parganas of common *Rai*. The name in the neighbourhood of Calcutta is therefore synonymous with *ai* (black).

Kala Sarica (কাল সারিকা); used three times; not, however, uniformly. It has reference to the dark colour of the seeds in each case, but with a Cuttack sample it indicated *Tori*; with a sample from Hooghly (Serampur) and another from Backerganj it indicated *Rai*.

Laki; *Rai*, or (লাকি).—A mere variant of the word *ai*, used as an alternative for a sample of that mustard from Chapra.

Laki sag; used in North Bengal for one of the "Cabbage-mustards."

Laka Tori; *Laki Tori*.—The adjectives indicate the colour of the seeds; *Laka Tori* was a brown-seeded *Sarica*, *Laki*

* Note by Dr. HARRIS.—Quite so. The usual form in Hindi is *pr* (प्र), which means a twig or sprig; and is a common emblem (but-mark) on certain coins of native states.

† Note by Dr. HARRIS.—Your suggestion might be correct. There is a word *jai* or *jhai* or *jhai* or *jhai*, which means "shrub, tree, bramble," almost synonymous with *jhai* or *jhai*; and *pr* might form into *jai*.

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Tori was *Rai*. The terms *Tora* and *Tori* are dealt with further on. It may be noted in passing that though both these plants came from the Dumraon Experimental Farm, neither the one nor the other was the actual *Tori* of the cultivator.

Langri.—A term sent, without vernacular characters, from the Dumraon Farm with a mixed sample of "tall late" and "rough early" *Rai*. The name, if it be used in the ordinary sense (*langra*), has no obvious significance.

Li Serika.—A term, of which the vernacular form was not sent, that accompanied a clean sample of tall late *Rai* from Mymensingh (Jamalpur). Like *Laki* it seems a mere local variant of *Rai*.

Lafai (লাফা).—This term by itself accompanied six different samples; was given as an alternative name with a seventh, and in the form *Lafai Rai*, accompanied still another. The word means "dwarf," and the sample termed *Lafai Rai*, which came from Arrah, was the short 'smooth early' subrace of *Rai*; the name was thus fairly applicable. It is not, however, to *Rai*, but to *Tori*, the shortest of our three Bengal mustards, that the name *Lafai* is usually applied. As employed throughout Chota Nagpur, in Hazaribagh, Lohardaga, Palamau, and Singhbhum, it applies only to the mustard which is termed *Tori* in Tirhut and *Meghi* in Eastern Bengal. The use extends beyond Chota Nagpur, however, for one of the samples so named is from the Southal Parganas, another is from Birbhum, and the last is from Bankura. But outside Chota Nagpur there is a want of definiteness in the usage. Thus in Birbhum the same sample, which is really *Tori*, is termed "*Lafai* or *Meghi*," i.e., both the Chota Nagpur and the East Bengal names are used in preference to the Bihar name *Tori* or the Bengal name *Serika*. In the Southal Parganas too, where both *Lafai* and *Meghi* are used, they are applied to different samples; both are *Tori*, but the Chota Nagpur name is restricted to the taller kind, the East Bengal name to the shorter, more early ripening sort; and in Bankura the name is misapplied, for it accompanies *Rai*. As has been already explained, however, the name *Rai* is given to a Bankura sample of *Tori*, and the chances are perhaps greater that a mistake has been made by the sender of the samples than that the cultivators do not know *Rai* and *Lafai* (*Tori*) when they see them.

Meghi Serika (মেঘি সেরিকা).—This name was used with ten samples. Seven of these, from Rangpur, Mymensingh, B. 799—855.

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na, Faridpur, Bocherung, and Tippera, indicated *Tori*, and in all, except the Rangpur sample, the shorter earlier sort of this mustard was what was sent. In no case was an alternative name sent, and it may therefore be taken as usual, if not the only, name for *Tori* throughout Eastern Bengal. The name occurs in western districts also. Thus it is used in the Sonthal Parganas exactly as it is in East Bengal, for the shorter sort of *Tori*, the Chota Nagpur name (*Lefai*) being used for the taller sort; while it is used in Birbhum as an alternative name with *Lefai*, again for the shorter kind *Tori*. But though the name *Maghi Serica* is sent also from Jessore, it is there quite misapplied, for it is used with a tall late subrace of *Rai* that does not ripen till after *Magh* (January-February) is over. From Burdwan the term *Maghi* accompanies the rough early subrace of *Rai*; though ripening before the Jessore sample, this also, at least at Sibpur, does not ripen till after the end of *Magh*. As applied to *Tori*, especially the shorter earlier kind, the name is particularly apposite, that being the earliest to ripen of all the Bengal mustards.

Rai (রাই); used only once, for the sample just mentioned, from Burdwan, as an alternative with *Maghi*. The plant was an early *Rai*, and the name may be only a local variant. A curious thing is that the name *Rai* came from the same source with another sample of the same 'rough early' subrace. *Akhan dand Serica* (আখান দান্দ সেরিকা).—A name sent from Burdwan with a clean sample of erect 2-valved white-flowered *Serica*; it describes the seeds well.

Our Serica (আমর সেরিকা); sent from the Sonthal Parganas (Jalpaiguri) with smooth early *Rai*. The name is apparently equivalent to the "our own special" of the European farmer.

Early Serica (এরলি সেরিকা); sent from Midnapore with the smooth early *Rai*, which is the least common of the subraces in the Lower Provinces. The meaning of the term is not clear.

Magahi Serica (মগাহি সেরিকা); used twice: once from Jessore, once from Tippera; in both cases for *Rai* (the taller sort). The term is said to mean "*Rai* introduced by the Moguls." It is not unusual, in Eastern Bengal especially, to use this prefix for any plant obtained from Upper

Notes by Dr. HENRIE.—This explanation is plausible enough. I find the vernacular is spelled *Magahi*, with *h*, instead of *g*. The Moguls or Moguls are never called "*Maghi*." The proper form is *Mughal*.

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India. In West Bengal it is at times used as a synonym for anything of western origin, even if it be European.

Natura Sarsā.—This name was sent from Arrah also with the erect 4-valved white-seeded *Sarsā* as opposed to the 4-valved with pendent pods, which was termed *I Sarsā*. The appositeness of the latter name is obvious but the meaning of the other is not altogether clear. *Natura* is in Bihar the skeleton bamboo "winder" on which the weaver's thread is wound; and the name is also applied to a stunted bullock, possibly because of his bones showing through the skin as the ribs of the winder show through the yarn; by transference *Natura* applies also to people in poor health or in poor circumstances. But the meaning in the present case is perhaps direct, for the pods of this kind of mustard are not unlike a "winder" when covered with thread. It can hardly be intended to convey the indirect meaning of poverty, because this happens to be one of the finest kinds of *Sarsā*.*

Pukari Rāi, Panni, Palangi.—These three terms are used as alternative names for the cabbage mustard with coarsely-toothed leaves which is cultivated in Sikkim and elsewhere in the Himalayas. It was sent to the Sibp. Farm from Kalimpong merely as *Rāi*.

Piarka Tori, Piarki Tori.—Names received from Dumraon Farm. The English equivalents given were "bold yellow rape" and "yellow rape." Both were erect 2-valved white-seeded *Sarsā*; the first a very slightly branched and very late sort with exceedingly large seeds, the second was the sort that has been sent from most of the districts of West and East Bengal as *Seti* or *Sheti*. The names, just as was the case with the *Lalka Tori* and *Lalki Tori* sent from the same place, refer to the colour of the seeds. The yellow sorts were, however, both *Sarsā*, whereas one of the brown sorts was *Sarsā*, the other *Rāi*.

Piyālā (or *Seti*) *Sariśā* (फैसल, काँच सरीश).—An alternative name sent from Burdwan for erect 2-valved *Sarsā*, of which the seeds were 90% white.

Purbī Sariśā.—This name was received with a sample of pendent-fruited *Sarsā* from Rajmahal. As this is a form of the mustard not uncommon in North Bengal, but practically

* NOTE BY DR. HENRY.—*Natura*, properly named 'dancer,' is a very good descriptive name, if it is taken from the "winder." The latter turns or 'dances' when the weaver's thread is wound on it, and is appropriately called the "dancer."

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down south and west of the Ganges, the name doubtless means that it has been introduced from the eastward to Rajmahal district.

is or *Rai Saris* (रै सरि, रै सरि-1).—This is one of the important names sent. In the substantive form (qualified) it was sent with twenty different samples, and 6 of these it applied to *Rai*. These fifteen came from Patna, Gaya, Dumraon, Muzaffarpur, Chapra, Purnea, Bhojpur, Sonthal Parganas, Bardwan, Nadia, Jessore, Chittagong, Rajshahi, Jalpaiguri (Bhalkota), Mymensingh. In the five remaining instances it was more or less misapplied. The Kalimpong sample, termed *Rai*, was the misunderstood *Snaps rugosa*, the cabbage-mustard of Patna. The Pabna sample was a mixture of *Rai* and *Tori*, but this mixture is quite as likely to have been the result of carelessness in the sender as of ignorance in the receiver. The Hazaribagh *Rai* was, however, *Tori*; the Patna *Rai* was *Saris*; the *Rai* of Singhbhum was a mixture of *Saris* and *Rai*. The explanation of this confusion in Chota Nagpur and Bankura seems to be that *Rai* is generally unknown throughout these areas.

In a qualified substantive, the name *Rai* was sent five times; two of these, from Arrah, viz., *Dhara Rai* and *Lata Rai* (this latter not to be confounded with *Lata proper*, which is really *Rai*; so was the sample sent from Chittagong "small *Rai*." The *Shah Rai* of Midnapore was, however, not the *Sada Bhada Rai* of the same district, a mixture of *Rai* and *Tori*.

In the adjective form *Rai Saris* accompanied seven samples, from Midnapore, Rangpur, Jalpaiguri (Devganj), Faridpur, Backergunge, and Tippera. In each case the sample was *Rai*.

Regarding the incidence of this name, no dispute is possible. It applies, as said by Roxburgh to *Snaps ramosa* (now *juncea*), and not, as said by Hooker and Thomson, to *Snaps glauca* or *S. dichotoma* (*Brassica campestris*). *Rai* (रै).—This term, a diminutive form of *veeding*, accompanied four samples. Its incidence is uniform. One of the samples, termed *Rai*, sent from North Bhagalpur, was one of the shorter ones of *Rai*, but the sample from Purnea, termed *Rai*, was tall late *Rai*, and as it happens, consisted of the best plants in the whole field! The *Rai* of Darbhanga and the *Rai* of Monghyr were *Tori*; as applied in the name is quite appropriate. It will be noticed that the name is restricted to Eastern Bihar (Bhagalpur

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Division), and that the people use it for different plants in different districts.

Sada Bhatta Rai (सदा बहा राई).—This name was received from Midnapore. The term *Bhatta* is said to be applicable to anything 'round' or 'globular,' and may allude to the fact that the sample contained erect 4-valved fruited plants with thick swollen pods; the seeds being white explains the use of *Sada*. But there is nothing very definite about the sample, since it was a mixture of this erect 4-valved *Sera* with *Tori*, which does not have thick pods or white seeds.

Saddhara Sari (सदाधरा सरी).—Sent once from Midnapore with a clean sample of *Tori*. The name means "common mustard." The chief interest of the name is that it appears to explain the term *Sada Rayer*, which is one of the names given by Roxburgh for *Sinapis dichotoma* (*Tori*). No one has been able to understand why Roxburgh should have given this as a name for *S. dichotoma*, since its seeds are never white, and whatever name it may receive, it never is termed *Rai*. The writer, at least, is satisfied that *Sada Rayer* is simply a mistake for *Saddhara*.*

Chhachi (छाछ).—This name only came with one sample, from Burdwan. The plant was *Tori*; this name too possesses the interest of being one of those applied to *Tori* (*Sinapis dichotoma*) by Roxburgh. The name means "genuine," "excellent," "first class," in the sense in which these terms are used by a European advertiser.

Sari (सरी).—One of the most important of our terms, being the Sanskrit *Siddhatrika* (सिद्धत्रिका) and verbally the Hindi *Sera* (सरा) or *Saria* (सरिया). It is usually supposed to denote a light-coloured variety of mustard, *Sera* (सरा), but it is interesting to find that this, whatever it may be elsewhere, is not the usage in Bengal. In a single instance, from the Sonthal Pargana, a sample is sent as *Sari*, which is actually as well as verbally the same as *Sera*, and has therefore white seeds. But the eight other samples with which the name has been sent (from Chittagong, from Puri in Orissa, and from Nadia, Murshidabad, Rajshahi, Pabna, Dinajpur, and Malda in Bengal) are in every case clean samples of *Tori*, the Indian "Rape," a brown-seeded mustard.

*NOTE BY DR. HENRI.—I think your suggestion is probably correct, that *Sada Rayer* is a mistake for *Saddhara*.

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the various qualified uses of the word *Sarai* are recorded about the list, and need not therefore be alluded to.

The form in which the name is given by Roxburgh, who as it accurately to this mustard, is *Sarai* in the *Indice*, *Sarai* in the *Hortus Bengaleus*.

In connection with this point it is interesting to note that in botanical papers *Sarai* usually is taken as denoting a variety of mustard with light-coloured seeds.*

Sarai, *Sarai*, *Sarai* (सरै, सरै, सरै).—Though identical with the preceding, this name is applied to quite different plant. We have seen that on one occasion the name *Sarai* was applied to the *Sarai* plant; but though the name is sent without any qualification with eleven different samples, *Sarai* is not in a single instance used for a plant that in Bengal proper is known as *Sarai*. The *Sarai* and *Sarai* occur throughout Chota Nagpur, Bihar, and Tirhut, being sent from Loharlaga, Hazari, Monghyr, Bhagalpur, Gaya, Patna, Saran, Muzaffar, and Darbhanga, the form *Sarai* occurs in Purnea and Koroong.

On three other occasions the name occurs in a modified form—*Janda Sarai*, *Nalua Sarai*, *Uti Sarai*: all three are names of the white-seeded mustard here described as *Sarai*. It is strange that, although there is just as little doubt in the case of *Rai*, as to the plant to which the name *Rai* applies, both Roxburgh and afterwards Hooker and

NOTE BY DR. HENRI.—Scholars may have good reason for what they state. They treat these matters, not from the botanical, but from the linguistic point of view.

In Sanskrit the terms *Sarai*, *Sarai*, *Sarai* do not exist at all. The only term which exists there is *sarapa* (सरप), of which at this point is quite certain linguistically *Sarai*, etc., are vernacular forms. Now, in Sanskrit *sarapa* is a "class" name, specific, it signifies a variety of plants of much likeness to many mind (though not necessarily to the botanist); these are distinguished in Sanskrit by adding specifications, "white," "black," "not white," etc. A pandit, or Sanskrit scholar, simply states the Sanskrit usage of the term, which must be well known in old times, and at all times, to the people of the country in the case of such a common plant. Further, a linguist: Sanskrit words may assume two forms in the

(1) a similar or (2) a dissimilar. In the case of *sarapa* forms are (1) *Sarai* (2) *Sarai* or *Sarai*. In the vernacular different forms are specialised and applied to different varieties (not in the botanical, but linguistic sense) of *sarapa*. Moreover, the usage of this specialisation of vernacular terms differs in different parts of India; thus the usage in Bengal is not the same as (say) in the Panjab.

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Thomson should have misapplied it. They do not use it for the same plant, however. Roxburgh uses it for *Tori*, a mustard to which it is never applied in the Lower Provinces; Hooker and Thomson use it for *Rai*, a plant to which it is not applied anywhere in India. The mistake in the latter case has, however, as already explained, been merely the result of the transposition of two passages that are otherwise quite accurate.

Seti, *Steti*, *Sheti*, *Sarai*, *Sheti*, *Rai*, *Suet*, *Sarai*, *Seeti*, are local modifications of the same name *Çitta*, (चिटा) applied throughout Bengal to the mustard that in Bihar and Chota Nagpur is termed *Sarai*. The name refers to the fact that the seeds are white; it never occurs outside Bengal Proper, just as the name *Sarai* never occurs within that province. The name is used as often substantively as adjectively. In the latter case it is only once associated with *Rai*; this happens with a sample sent from Midnapore. All the other instances of adjectival use accompany the word *Sarai*. It is interesting to note that it is this very uncommon usage which is recorded by Roxburgh, for he gives *Shuet Rai* as the native name for his *Sinapis glauca*.

Naya Sarai (नया सराय)—transliterated *Staya* and *Staya*—is a name sent twice from North Bengal. In one case, from Rangpur, the name is applied to *Sarai*; in the other, from Jalpaiguri, it is used for *Tori*. What the meaning may be is not clear. The word is applied in Bihar to the broad of wheat and millet; its application here is not evident.

Tori Sarai (तरी सराय) sent as *Tori* from Purnea, *Tori* from Dinajpur, and *Tharia* from the Sonthal Parganas. All three were *Sarai*, and the name, if it means, as the writer's native informants explain it does, "the opposite of straight," it is very apposite to the Purnea sample, that being the *Sarai* with curved stalks and down-turned pods. But there is some doubt about this in the writer's mind, for both the Dinajpur and the Sonthal Parganas samples had up-turned pods with straight, erect fruit-stalks.

Tori, *Tori*, *Turi* (तरि, त्रि, तुरि).—This is one of the important names. The form *Tori* is very rarely employed:

* NOTE BY DR. HERNIM.—*Tori*. I agree with this. *Tori* is Sanskrit *torṣa*, which means "oblique, transverse, horizontal; crooked, curved." It is applied to animals, as walking "horizontally" compared with the erect position of men.

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if it is used, it is applied always to *Sesam.* or Indian *as* (*S. glabra* Roth). The diminutive form *Tori* is, on the other hand, in common use in Bihar, and there it usually indicates the Indian Rape, the *Tori* of Chota Nagpur, the *Sesam* proper of West Bengal, the *Majra* of Bengal).

The *Tori* of Gaya was *Sesam*, as were the *Tori* and the *Tori* of the Dumraon Farm, as was the *Gangaya* of Orissa, at least in part.

The *Tori* of Munaffarpur, Bhagalpur, and Purnea were *Sesam*, as were the *Tori* of Sili pur and of Dinanagar. But the usage is not altogether uniform in Bihar, though it seems to be fairly so in Upper India, for the *Tori* of Barharganj and of Monghyr were *Sesam*, as was also the *Tori* of the Dumraon Farm. The *Purnea Tori* of that institution was on the other hand a *Sesam* with rather smaller seeds than the *Sesam* sent as *Purnea Tori*.

The meaning of the names *Tori* and *Tori* is not clear. (Hear *Purnea Tori*, p. 112, & 212) quote a local rhyme of the Gaya district in which *Tori* is translated "small seeds." Perhaps this is all the meaning the words

may convey whatever their origin may be. It is interesting to note a discrepancy in the usage of the diminutive

Tori. Generally applied to Indian Rape, with seeds as large as those of *Tori* (*Sesam*), but with the plant much smaller, it is at times used for *Rai*, which is generally a larger plant than *Sesam* (*Tori*) but has much larger seeds. We have already seen the same discrepancy in the use of *Chota Sesam* in Angkor and in Orissa recently.

The *Sesam* (*sesam*),—Sent from Arrah along with, in opposition to, *Nafan Sesam*. The name was applied to a *Sesam* with hanging pods, and its meaning is not clear.

NOTE BY DR. HARRIS.—Your word *Tori* puzzles me. The three principal words are *Tori*, *Rai*, *Sesam*. The two latter are well, and they have their equivalents in Sanskrit. But I never heard of either of your paper, and it is curious it should not be mentioned at all in *General's Indian Purnea* (ed. I except has *Tori* in §§ 144 and 212). Nor do I know what it means in Sanskrit. Do you happen to know what its equivalent is supposed to be? Nor can I find it in any dictionary, Arab or Hindi or Bengali. It seems extraordinary that vernacular names should not quote the word at all. Whether in any of its incorrect sense, if it is current so largely and widely.

Summary.

SECTION VII.—SUMMARY.

In the Lower Provinces three very distinct mustards are generally cultivated:—

Rai, or Indian mustard, the most important of these, is grown in all the provinces except Chota Nagpur, where it is practically unknown, though it seems to be cultivated to a slight extent in Singhbhum. It is easily recognized by having none of its leaves stem-clasping; and, after reaping, its seeds, which are brown, can be readily distinguished from those of *Tori*, or Indian Rape, by their smaller size, their being distinctly rugose, and being reddish brown all over. From *Sarson*, which has white seeds or, less often in Bengal, brown seeds, it is equally easily distinguished; *Sarson* seeds are always considerably, often very much, larger, and even when brown have the seed coats smooth.

There are three subspecies, a tall late kind and two shorter earlier kinds, one of these latter roughish with bristly hairs, the other smooth with darker coloured stems. The taller subspecies is quite absent from Chota Nagpur and from Tippera and Chittagong. The shorter subspecies are quite absent from Orissa, and are absent from North Bengal except Dinajpur, and from East Bengal except Tippera.

The name *Rai*, occasionally *Lahi* or *Li*, once also *Ma*, occurs everywhere except in Orissa, where this mustard termed *Chota Sarsona* (*chotam* 'small', with reference to seeds). In various districts other names are locally applied either alone or as alternative names for *Rai*. These will be found discussed in § VI. The term *Rai Sarsona*, a word used as an adjective instead of as a substantive, in the place of the more usual form *Rai* throughout Eastern Bengal.

Tori, or Indian Rape, the next in importance, is so from all the provinces, though it is not reported from the most western districts (Saran and Shahabad) of Bihar. It is easily distinguished from *Rai* by its stem-clasping leaves and its small size; when reaped the seed is recognized as being larger, though of the same colour, and by having a paler spot at the base of the seed; the seed coat, too, is only slightly rough. From *Sarson*, or Indian Colza, it is easily distinguished by its smaller size and by its leaves, though stem-clasping, as in *Sarson*, being less lobed and having much less bloom. The seeds are of much the same size in *Tori* and in ordinary *Sarson*, but as a rule the seed of *Sarson* in Bengal are white. When *Sarson* seeds are brown they are of an amber colour, and have no paler spot.

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ered coat, too, is smooth. The seeds of *Sesuvium* are considerably larger than those of *Tori*. When this is the case the two are easily distinguished.

There are two kinds of *Tori*—a taller, rather later, and a better, very early, kind. Both kinds, however, are well paid of any *Rai* or any *Sesuvium*. The earlier kind of *Tori* does not appear to occur in North-West Tibet, the later kind is unknown in East Bengal or in Chittagong, elsewhere both sorts prevail throughout the Lower Provinces.

This mustard is known as *Tori* in Bihar and the northern districts of North Bengal, *Lata* in Chota Nagpur and the northern parts of West Bengal, *Sarish* in Orissa, West Bengal, Central Bengal and the south-western districts of North Bengal, *Majhi* in the south-eastern districts of North Bengal and throughout East Bengal. The Bengali name *Sarishka* recurs in Chittagong.

Saxum, or Indian Colza, occurs in every province except Chittagong, where it is replaced by a different mustard. It is easily distinguished from *Rai* by its stem-clasping leaves, from *Tori* by the greater amount of 'bloom' on its foliage, by its taller stature, its more rigid habit, and its thicker, longer pods. When ripe the seeds are distinguished by their usually white colour; when brown the seeds are distinguished readily from those of *Rai* by the larger size and the grey seed-coat; from those of *Tori* by their being of a darker brown, and by not having a paler spot at the base of the pod.

There are two races—one with erect pods, the *Natal Saxum* proper, and one with pendent pods, the *Utricularia*. Each race has two distinct subraces—one with 2-valved, the other with 3-4-valved pods.

The forms with hanging pods are not common except in North Bengal and East Tirhut (Purnea), the subrace with 2-valved pods being almost confined to this area. But the 2-valved kind extends sparingly through Western Tirhut, crossing the Ganges spreads southwards through South Bihar and Western Chota Nagpur.

The forms with erect pods practically occur everywhere. The 2-valved subrace, however, is little known in Bihar, though it is grown both in Shahdol to the south-west and Monghyr to the south-east. It extends over the whole of Chota Nagpur and over Orissa and West, Central, and East Bengal. The 4-valved subrace occupies West Tirhut and West Bihar, extending thence sparingly through South Bihar and along the dry parts of West Bengal, as far south as Midnapore. It also occupies North Bengal.

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and the northern part of East Bengal (Mymensingh),^f the exclusion of the 2-valved subrace. Roughly speaking therefore, the 2-valved erect subrace is characteristic of Chota Nagpur, Orissa, West, Central and East Bengal: the 4-valved erect sub-race is characteristic of the western half of Bihar, and again of North Bengal, while the pendent subrace occupy the region between the areas to the north of the Ganges occupied by the erect 4-valved subrace.

The name *Sarson* prevails in Chota Nagpur, in Bihar, and in extreme North Bengal. In Bengal Proper this is the mustard known as *Surti Sarisak*, or simply *Surti*. In Orissa it is *Ganga toria*.

There are two other field-mustards cultivated. One of these, confined to Chittagong, seems to be a form of the true or European Colza; the other, or Nepalese mustard, is the same as the Cabbage-mustard (not to be confounded with the China Cabbage) of Chinese cultivators. This latter is sent from the Darjeeling district only. From the same district comes a garden-mustard, *Bhutia Rai*, which is not distinguishable from the European Sweet Rape, while another garden-mustard, *Laki Sag*, is grown throughout North Bengal; this last is a Cabbage-mustard, in habit very like, but still very distinct from, the Nepalese Cabbage-mustard.

As regards the relationship that our three staple mustard-oil crops bear to the corresponding crops in Europe, it may be tentatively held:—

(1) that *Rai* (*Brassica juncea*) is a crop not grown in Europe, at any rate on a commercial scale, but that it takes the place here of *B. nigra* and *B. alba*, which in turn are not grown in India;

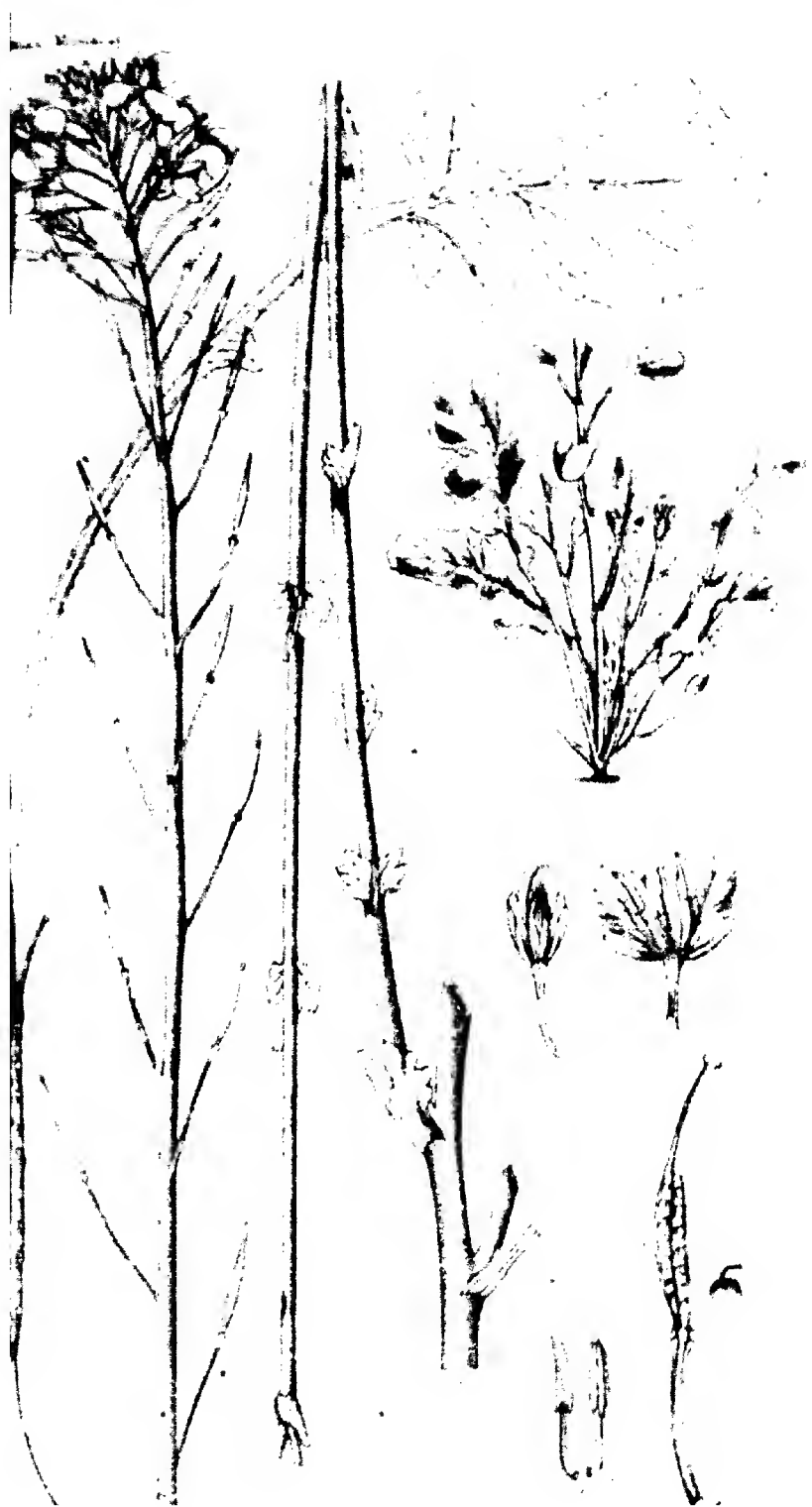
(2) that *Sarson* (*B. campestris* var. *Sarson*) is a crop not grown largely, if at all, in Europe, but that in India it takes the place both of *B. campestris* var. *oleifera*, and *B. Rapa* var. *oleifera*, which in turn are hardly ever met with here: finally,

(3) that *Tori* (*B. Napus* var. *dichotoma*) seems to be the same plant as *B. praecox* (Summer-rape), or if not the same is at least very like and very near it, and is undoubtedly the plant that in India takes the place both of *B. praecox* and of *B. Napus* var. *oleifera*.

Erigeron strigosus





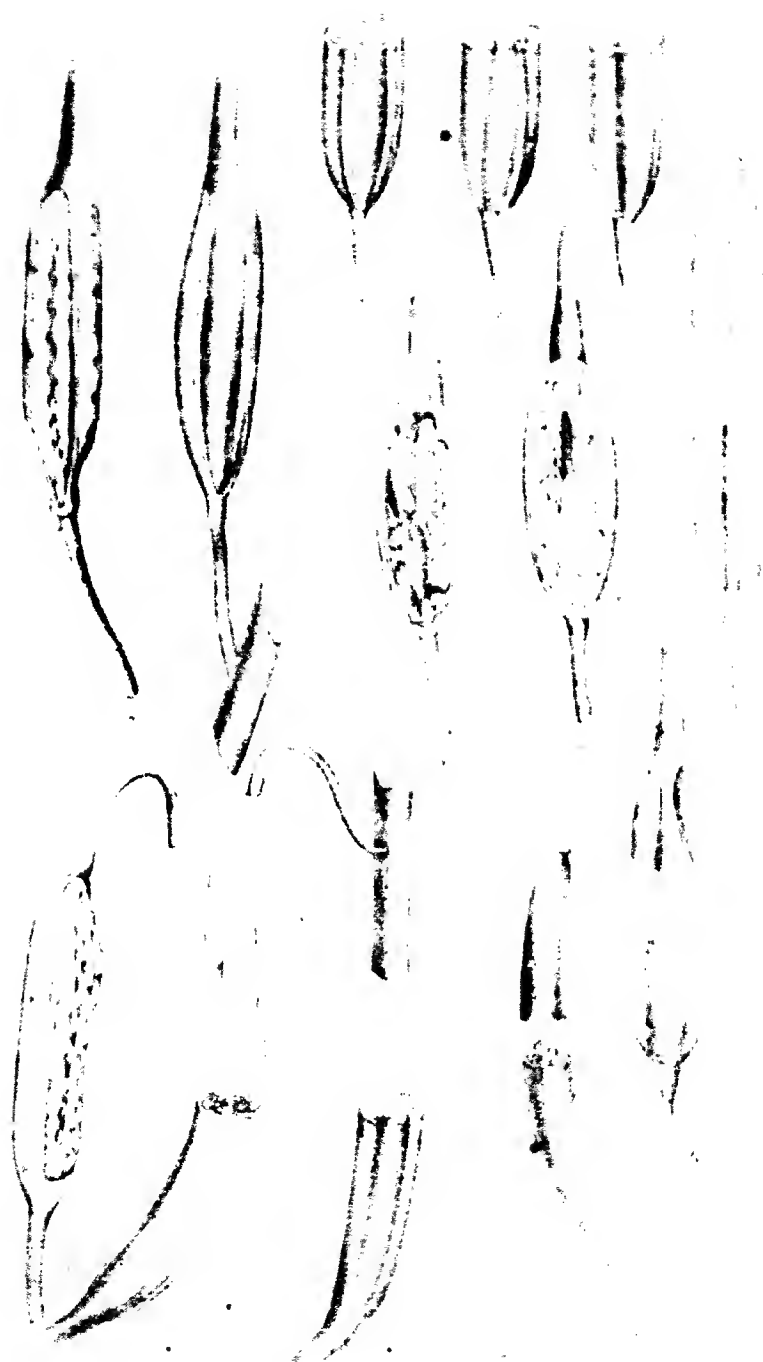






BRASSICA CAMPESTRIS, L. var. CARBONARIA, Pers.
 SINAPIS TRILOCULARIS, Roxb.

Bot. Beechey







BRASSICA NAPUS Linn var. ESCULENTA DC.

Field of New Britain - 1901



